CANADIAN MACHINERY AND MANUFACTURING NEWS

A weekly newspaper covering in a practical manner the mechanical power, foundry and allied fields.
Published by the MacLean Publishing Company, Limited, Toronto, Canada

Vol. XXII., No. 22 Publication Office: Toronto, November 27, 1919 Subscription Price $3.00 per year.

BERTRAM MACHINE TOOLS

Illustration shows our No. 8 Double Angle Shear on plain base. Capacity, 8" x 8" x 1¼" angles. Motor drive, 15 H. P. motor.
Write for full particulars re any machine or machines in which you are interested.

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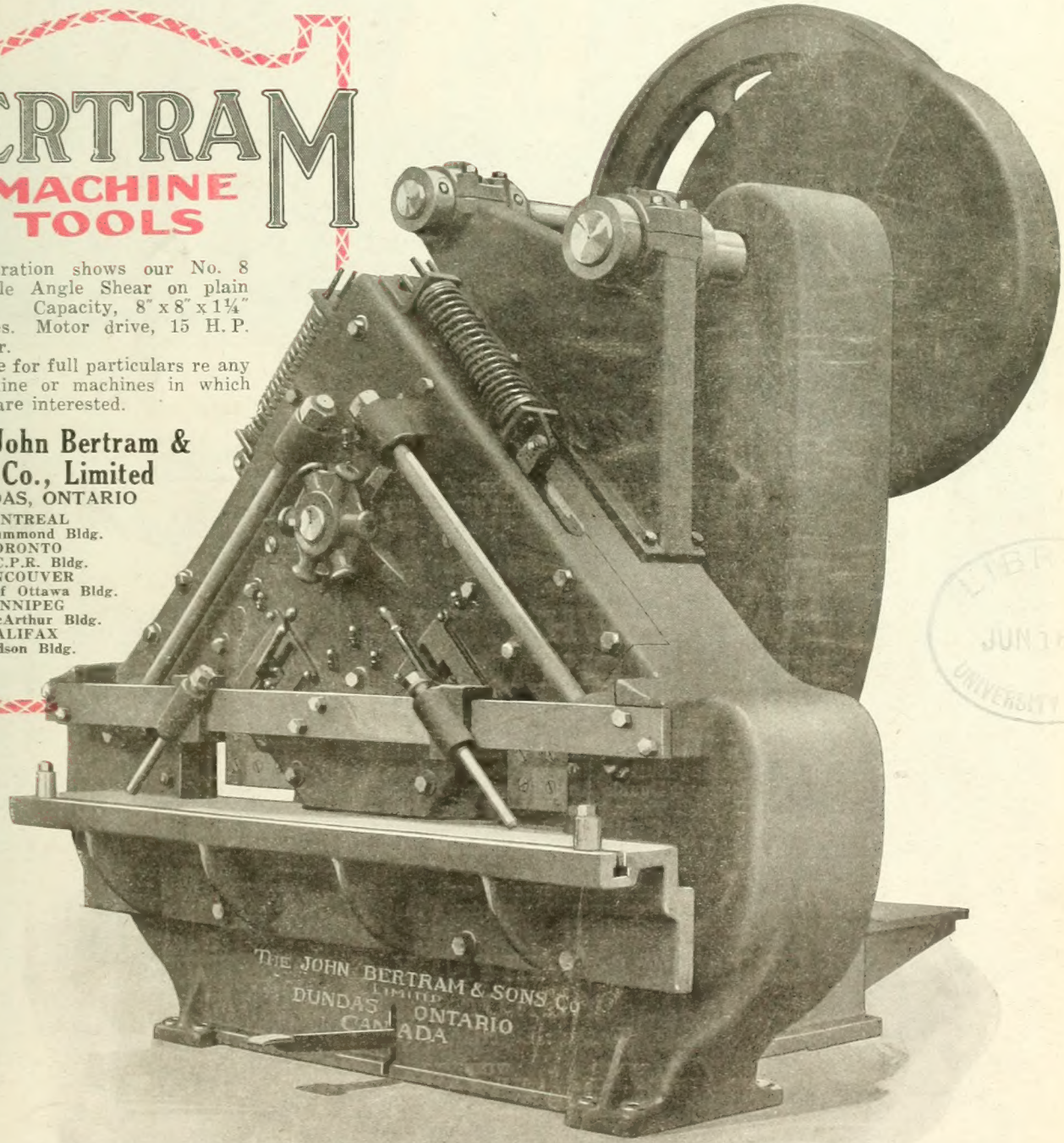

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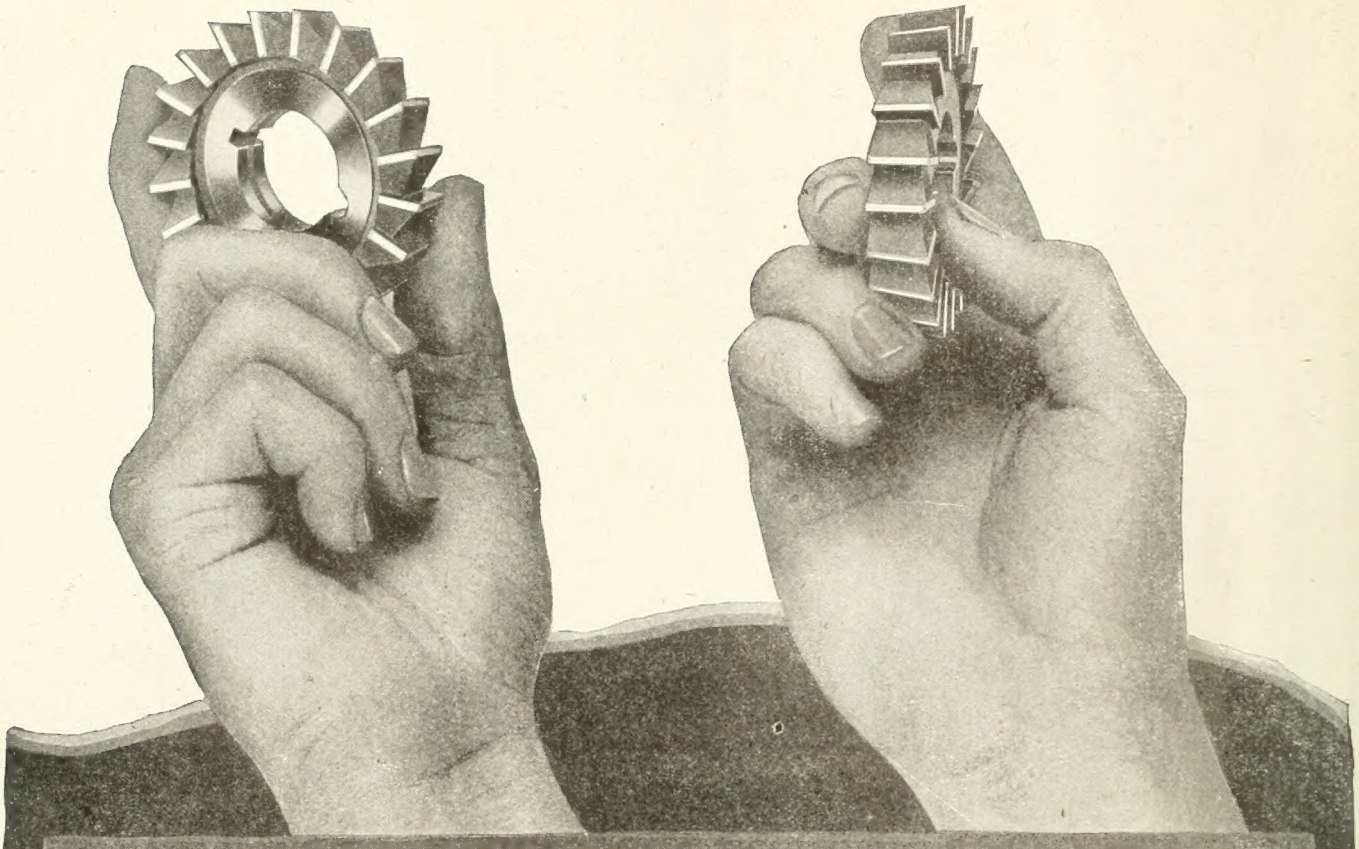

If it's speed you need—

One trial will prove the advantage of Pratt & Whitney Milling Cutters. No matter what the nature of the work they will give you the highest production the machine is capable of.

They're designed for free, fast cutting. And tempered and seasoned to last longer.

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Ask us for prices and details on Plain Milling Cutters, Side Milling Cutters, Inserted Blade End and Side Cutters, Screw Slot Cutters, Coarse Tooth Side or Plain Milling Cutters, Involute Gear Cutters, Concave, Convex, and Double Angle Cutters, Cutters for Spiral Mills, Roll Thread Die Hobs, Key-seating and Slotting Cutters, Straight and Spiral Cut End Mills (B. & S. and M. T. Shank), Spiral and Straight Shell End Mills, etc.

And we make formed cutters for special work also. All are backed by the guarantee for goodness that the P. & W. trademark indicates.

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The BERTRAM Page

MACHINE TOOLS

JB&SCo

18-inch Crank Slotting Machine

A. C. Motor Drive Through Speed Box

10 H.P. Motor--1,000 R.P.M.

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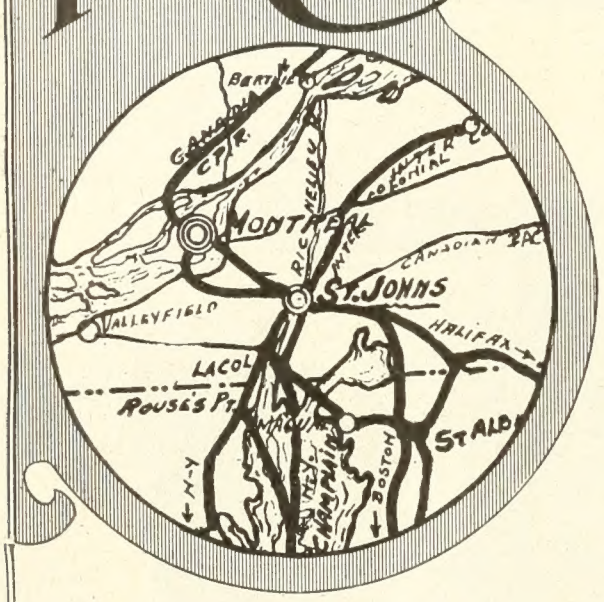
The City of ST. JOHNS, QUEBEC



ITS LOCATION

It is located in the Province of Quebec which, as regards industries, is to Canada what New England is to the United States. (It is 27 miles, or 45 minutes, from Montreal).

ITS RAILWAYS

The two big railroad systems (double track) of Canada, the Canadian Pacific and the Grand Trunk Railways, pass through St. Johns, where merchandise can be shipped and exported anywhere upon the globe with dispatch. These railways are connected by a terminal switching system: charges at exceedingly low rate. All Eastern U.S. railroads are connected with St. Johns.

Direct Connections with Docks at Montreal

Goods can be exported direct by steamers to European, South African, South American and West Indian Ports.

St. Johns has long been recognized as the cheapest labor centre in Canada. Reasonable rents and living costs are keeping it so even in these times.

No other locality offers the following inducements to new industries---but we do

Exemption of taxes for fifteen years' period that is subject to extension. All public improvements which you may require, such as extension of streets, sidewalks, waterworks and sewerage; five per cent. bonus to you on your payroll for five years and if you wish we will advance this to you to be applied to the purchase or erection of any building suitable to your purpose.

For more specific information write to

The Secretary of the City Council

St. Johns, Quebec, Canada

By Product Coke

Hamilton Pig Iron

Open Hearth
Steel Billets

Steel and
Iron Bars

Open Hearth
Steel Sheets

Drop
Forgings

Quality

THE
STEEL COMPANY
OF
CANADA
LIMITED

HAMILTON MONTREAL

Service

Railway
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Pole Line
Hardware

Screws & Nails

Bolts Nuts & Washers

Wire & Wire Products

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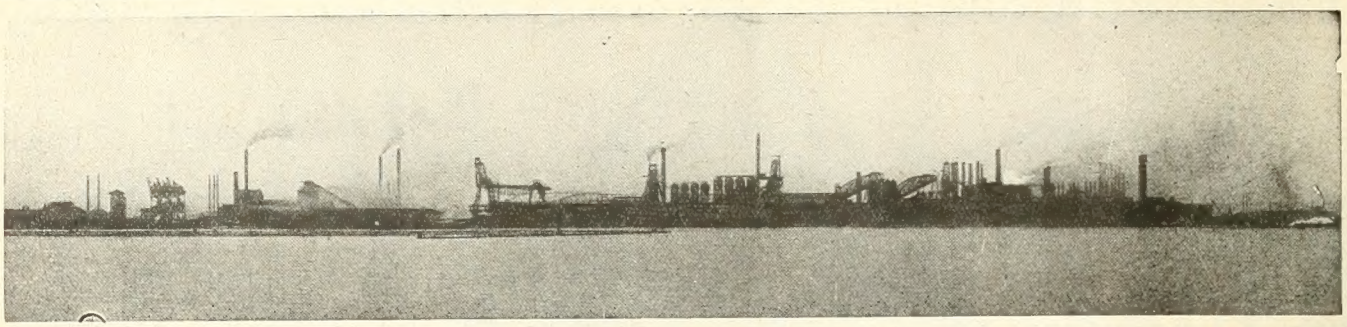

General View of the Plant of the Algoma Steel Corporation from the Waterfront.

ANNOUNCEMENT

THE ALGOMA STEEL CORPORATION, LIMITED, take pleasure in announcing to their customers and the Canadian trade that in accordance with the widespread desire throughout the Dominion that there should be obtained in Canada with Canadian labor, a much larger proportion of the requirements of this country in STEEL SECTIONS for STRUCTURAL PURPOSES, CAR CONSTRUCTION, SHIPBUILDERS' REQUIREMENTS, etc., they are just completing extensive alterations and additions to their rolling mills, and on or about 1ST NOVEMBER, will be ready to produce and ship American Standard Sections of BEAMS and CHANNELS up to and including 15", all standard sections of ANGLES from 6" x 6" down to 1¼" x 1¼", ZEE BARS for car builders and general purposes, small and large ROUNDS and SQUARES, and FLAT BARS up to 14" wide. The quality of the product is already well known to the trade, and is exclusively steel made by the Open Hearth process. and can be furnished in all grades from the softest rivet stock to high carbon special spring material.

MARK OF ALGOMA O.H. QUALITY

The following are the sections which will be rolled:---

ANGLES—Equal Leg—
6 x 6"—5 x 5"—4 x 4"
3½ x 3½"—3 x 3"
2½ x 2½"—2¼ x 2¼"
2 x 2"—1¾ x 1¾"
1½ x 1½"—1¼ x 1¼"

ANGLES—Unequal Leg—
6 x 4"—6 x 3½"—5 x 4"
5 x 3½"—5 x 3"—4½ x 3"
4 x 3½"—4 x 3"—3½ x 3"
3½ x 2½"—3 x 2½"—3 x 2"
2½ x 2"

BEAMS—
15", 12", 10", 8", 6", 5", 4", 3".

CHANNELS—
15", 13", 12", 10", 8", 6", 5", 4", 3".

ZEES—
3¼ x 5 x 3¼ x 5/16
3 5/16 x 5 1/16 x 3 5/16 x ⅜"
3⅜ x 5⅛ x 3⅜ x 7/16"
3 1/16 x 4 x 3 1/16 x ¼"
3⅛ x 4 1/16 x 3⅛ x 5/16"
3 3/16 x 4⅛ x 3 3/16 x ⅜"
2 11/16 x 3 x 2 11/16 x ¼"
2¾ x 3 1/16 x 2¾ x 5/16"

ROUNDS—
All sizes from ½" up to and including 4".

SQUARES—
All sizes from ½" up to and including 3".

FLATS—
All sizes from 1 x ¼" up to and including 14" wide.

MINE RAILS—
All sections from 12 lbs. up to and including 45 lbs. per yard.

PIG IRON—
Machine cast FOUNDRY MALLEABLE and BASIC.

SULPHATE OF AMMONIA.
NITRE CAKE.

For the better convenience of customers who may find it necessary to secure rush shipments of particular items, they contemplate keeping a large stock of all the various standard sections constantly on hand, and to this end extensive warehouse facilities are being prepared.
Your enquiries and business will be appreciated.

ALGOMA STEEL CORPORATION

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HIGH SPEED AND CARBON
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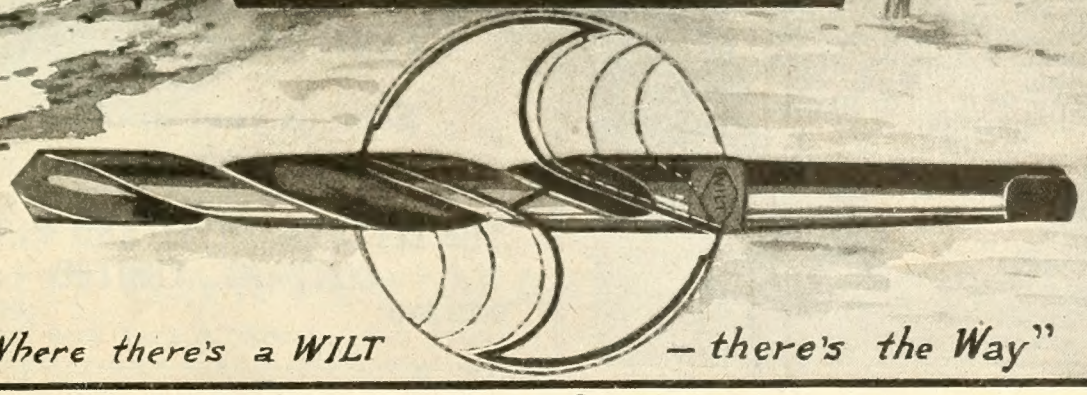
A high standard of perfection is maintained throughout the various processes of manufacturing **WILT High Speed and Carbon Twist Drills, Reamers and Milling Cutters.** **WILT** products improve production! This is no theory, no untested statement, but an established fact backed by many of the largest manufacturers throughout Canada. For steady, reliable output of work that is satisfactory from the standpoint both of quantity and quality there is no better choice than **WILT Products.**

Put Them to the Test

WILT TWIST DRILL COMPANY

OF CANADA, LTD. WALKERVILLE, ONT.

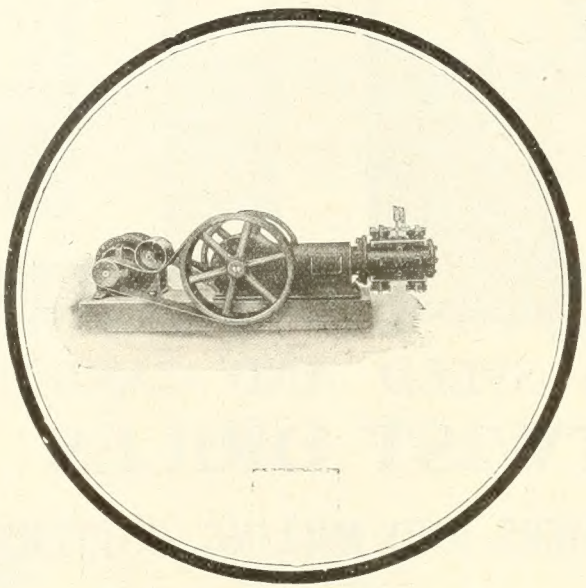
London Office: Wilt Twist Drill Agency, Moorgate Hall, Finsbury Pavement, London, E.C. 2, England.



"Where there's a WILT — there's the Way"

The Air Compressor for Cramped Quarters

The short-belt drive for air compressors is long past the experimental stage. It is the ideal drive for a compressor installed where space is at a premium. The total floor space occupied by motor and compressor is reduced to a minimum, the belt expense is cut down—running is smooth and quiet. In our own power house we have three two-stage compressors with this drive; we would not have installed them if the short-belt drive were not satisfactory.



All C-I-R-Co compressors are built to carefully determined standards of quality and design. Not only is all material subject to inspection, all shop operations have to secure the O.K. of the chief inspector; finally comes the running test which every compressor undergoes before shipment. The C-I-R-Co has been building air compressors for over twenty years and has a reputation to maintain. Our compressor bulletins will interest you.

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Steel Castings

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Of Every Description

Prompt Deliveries

Send us your drawings for estimates.

THE ELECTRIC STEEL AND METALS COMPANY, LIMITED
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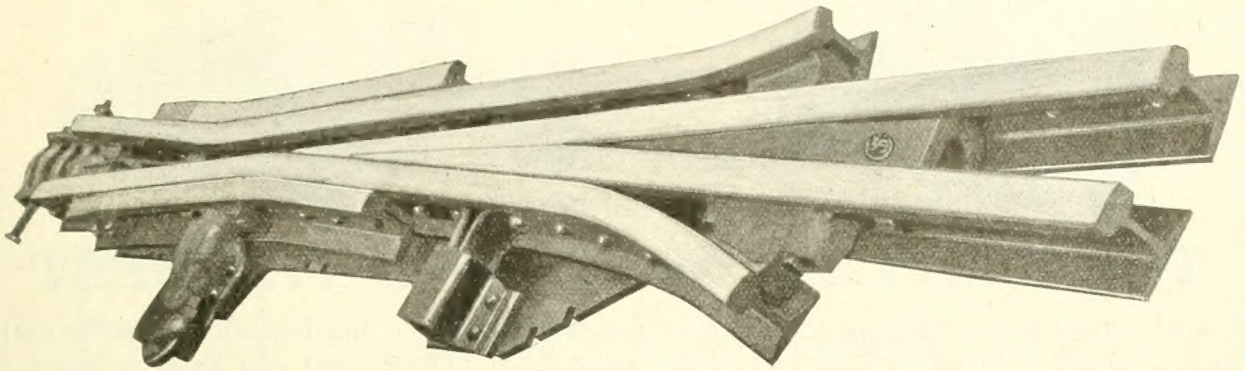
For Steam and Electric Railways



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Frogs Switches
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OBTAIN THE BEST RESULTS

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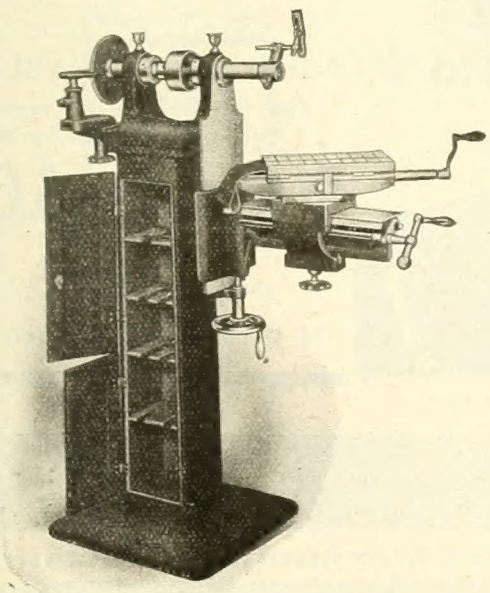
GARVIN No. 3 UNIVERSAL

CUTTER AND SURFACE GRINDERS

Simple Light Running Accurate



GARVIN No. 3, Universal Cutter and Surface Grinder
Use Code—Banish

The spindle is hardened and ground and supported out close to the wheel by an extended bearing, and carefully protected from emery.

The knee and the yoke carried on the knee both have a large range of adjustment. On the knee yoke or carriage is mounted the swiveling table, which has a quick, sensitive movement by rack and pinion operated from end or side.

On this table is mounted the index head, and all the attachments are held in this head.

An outfit of emery wheels, mandrels, bushings, wrenches, etc., is supplied with the machine.

Machine is designed to keep its original factory accuracy.

CAPACITY: CUTTERS, 14" x 6"; SURFACES, 9½" x 6"

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Manufactured by

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Spring and Varick Streets (*Visitors Welcome*) **50 Years New York City**

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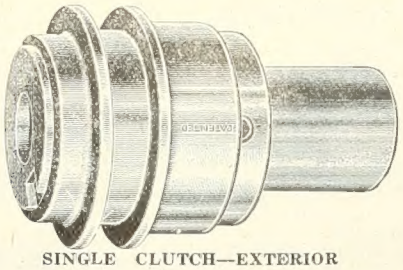
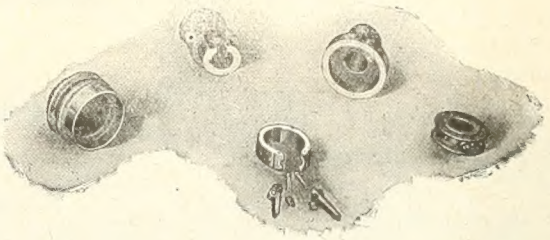


SINGLE CLUTCH—EXTERIOR



THE SIMPLEST WAY—AND THE BEST

In a clutch or any other mechanical device, unnecessary complication means trouble. Make a single part serve where two have been used before, and you have reduced by one-half the places that can break, wear or get out of adjustment. Put the cost of extra material into **better** material, and you have doubled the length of service.
In the Johnson clutch, this idea has been followed out to its practical limits. The result is a model of simplicity in clutch construction—a few sturdy parts, each correctly built and accurately tested for the duty it must perform. This lack of complication means continuous service and low maintenance cost. Johnson Friction Clutches stay on the job.

WE CAN BUILD TO SUIT YOUR NEEDS
WRITE FOR OUR YELLOW DATA SHEETS

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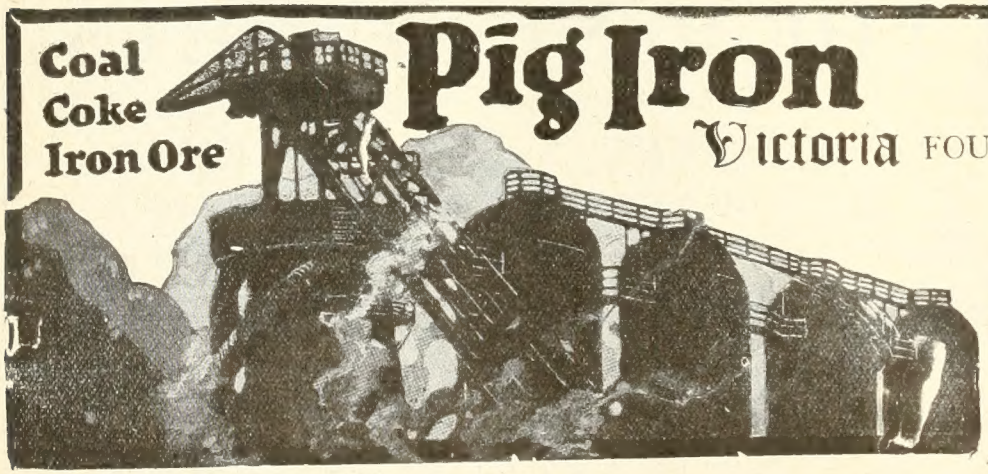
Iron Ore



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Victoria FOUNDRY & MALLEABLE

Made by The Canadian Furnace Co.
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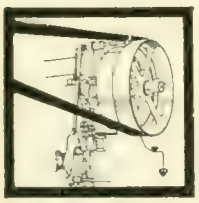
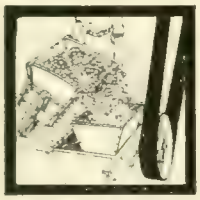
Cuts to left show where recommended. This belt is saving money for the firms who are using it.



GOOD ON BELT SHIFTERS

GOOD IN OILY PLACES



GOOD IN DUSTY PLACES

GOOD IN HOT PLACES

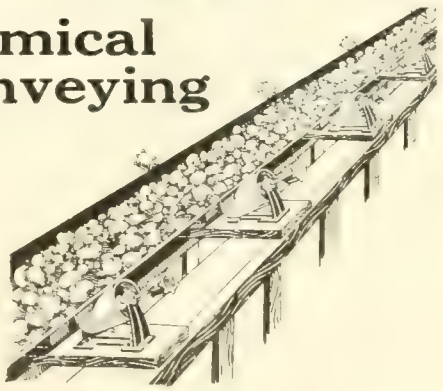
MANGE BELT

For Conveying

Our regular belt for abrasive materials.

An Economical Belt for Conveying

BROKEN STONE, ORE, COAL, COKE, ETC.



For materials that are non-abrasive, use our Special Conveyor. This is especially adapted for handling clay, pulp, sawdust, sand, etc., and is cheaper.

Write us about your requirements.

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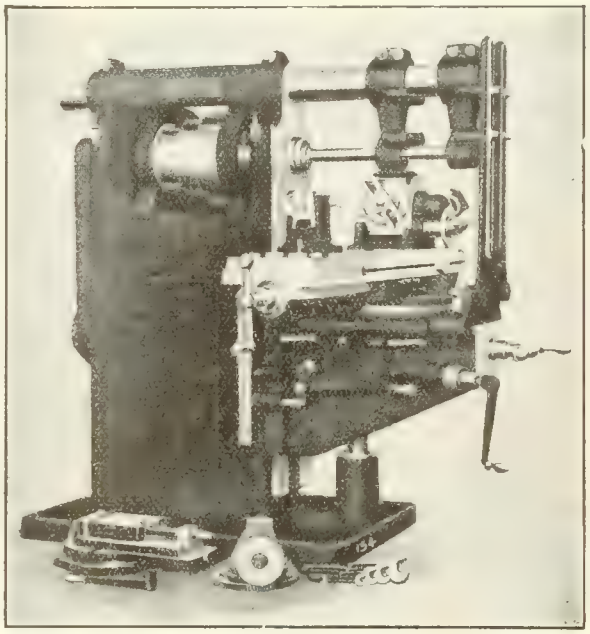

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Every Commercial Purpose

We are the only company in Canada producing steel ingots by the "HARMET" Liquid Process, a process that makes these ingots vastly superior to the ordinary kind, improving the physical properties and reducing the waste of ingot.

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Our infrequent orders testify to the quality of your MAGNOLIA METAL in resisting hard and continuous service.

It is a great pleasure to recommend anyone, looking for the best babbitt metal on the market, to you. Our experience has been entirely satisfactory from every viewpoint, especially so in connection with the courteous and intelligent handling of all orders.

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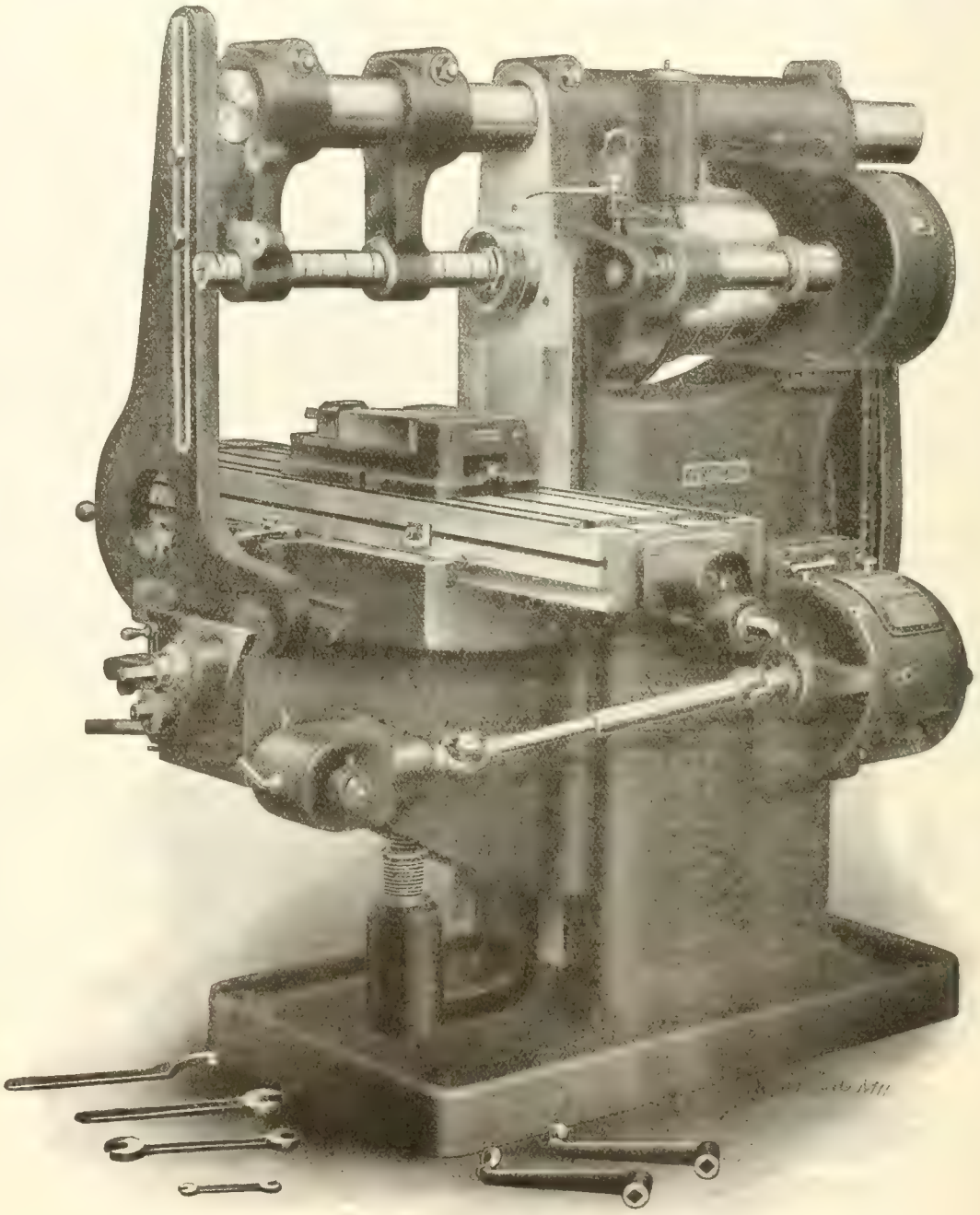

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Double Back Geared.

A heavy, powerful tool with double back gears and wide driving belt running on a three-step cone of large diameter. Our catalogue "B" describes and illustrates many notable features of the Kempsmith Miller. Write for a copy to-day.

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FOUNDRIES & FORGINGS
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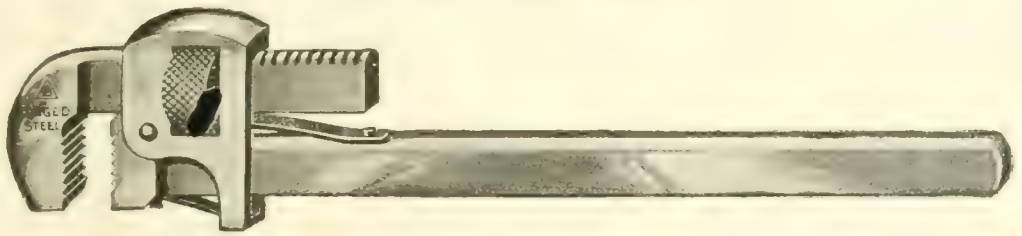
ENDURANCE TOOLS
NEVER WEAR OUT



PIPE THE WRENCH—WRENCH THE PIPE

Canadian Billings & Spencer Plant
Welland, Ont.

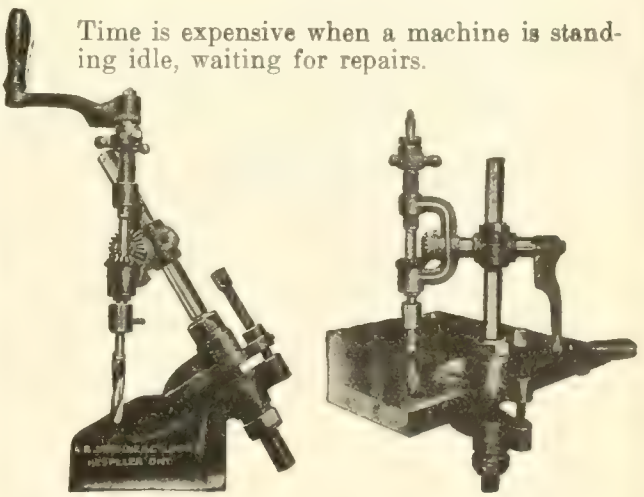
Crucible
AND
Open Hearth Steel
Tool Steel
"ARGO" BRAND *HIGH-SPEED* STEEL

The John Illingworth Steel Co.
1856
Frankford, Phila.
New York Office 217 Broadway

RALPH B. NORTON, AGENT
Montreal, Canada

Jardine Universal Ratchet Drill

Time is expensive when a machine is standing idle, waiting for repairs.



On the average repair job, this machine completes the drilling in less than the time required to set an ordinary ratchet to begin.

Weight, 40 lbs. Price, $26.50 net
Sold by all Machinery and Supply Houses

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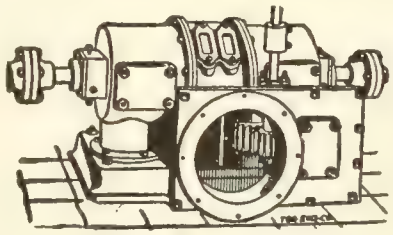


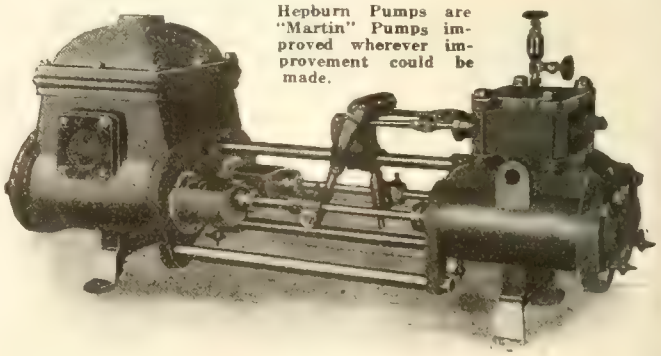
Over forty years' experience in designing and installing special turbines, both on vertical and horizontal shafts.
Can supply complete equipment, including flume, turbine and power transmission.
Stock of standard vertical shaft Little Giant Turbines on hand for prompt shipment.

We solicit your inquiries.

THE J. C. WILSON MFG. CO.
LIMITED
BELLEVILLE, ONTARIO

Hepburn Pumping Machinery

Our line embraces standard duplex pumps for boiler feeding and for fire and general service; tank or low service duplex pumps; duplex hydraulic pumps for service in connection with hydraulic lifts and presses, accumulators and oil presses; pressure or mine pumps; horizontal power pumps and air and circulating pumps, etc.



Hepburn Pumps are "Martin" Pumps improved wherever improvement could be made.

JOHN T. HEPBURN, LIMITED
18-60 Van Horne Street Toronto, Ontario

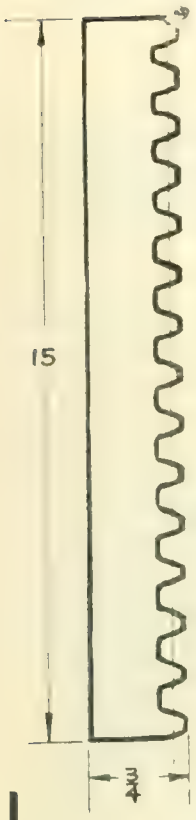
If what you need is not advertised, consult our Buyers' Directory and write advertisers listed under proper heading.

Production Milling
on the
Potter & Johnston
Automatic Milling Machine

The illustration herewith shows the method employed for cutting of racks in one of the largest shops in the country.

Two pieces are held in each fixture and the operation is carried out as follows:

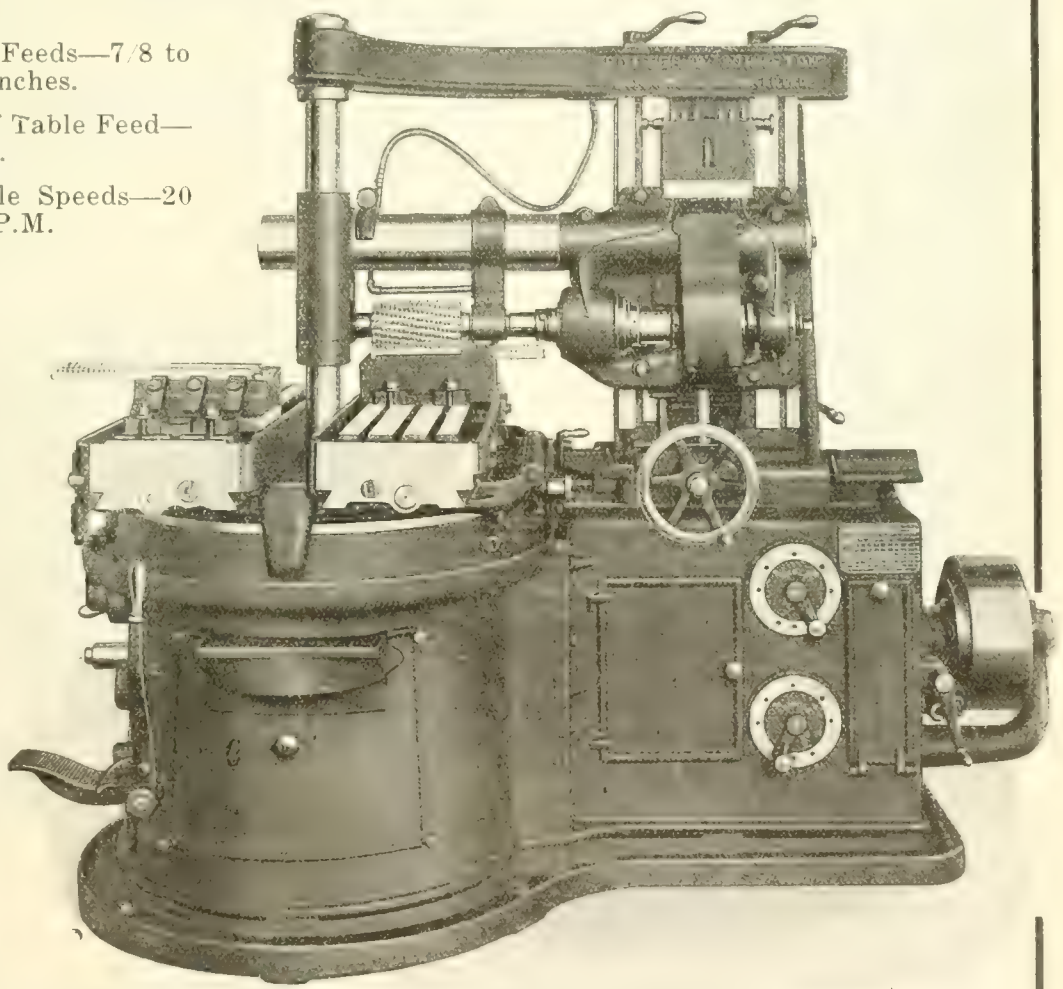
Pieces are placed in fixture and the teeth are cut for half the length of the rack, the table then revolves to the loading position and while the cutter is working on the racks just placed in the fixture, the operator is reversing the pieces in the other fixture ready to complete the rack, when the table revolves to its next station.



16 Table Feeds—7/8 to 12 5/16 inches.

Length of Table Feed—29 inches.

16 Spindle Speeds—20 to 180 R.P.M.



Compare this method with yours. Maybe we can help you. We want you to know more about this Production Milling.

Write us to-day.

Bulletin 40

Canadian Offices: POTTER & JOHNSTON MACHINE CO.

ROELOFSON MACHINE & TOOL CO., LIMITED

Head Office: 1501 Royal Bank Building, Toronto, Canada
Works and Warehouse: Galt, Ont., Canada

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Protected-

Where there are acid and alkali fumes, where there is smoke, gas and dust, where there is moisture and salt air, *where there is need for building protection, within or without*—there Robertson Process Metal will give sure and lasting service.

What Robertson Process Metal Is

By the Robertson Process, three impervious coatings—(1) asphalt, (2) asbestos, (3) waterproofing are built up on specially annealed steel. These coatings are so thoroughly incorporated with each other and so firmly adhered to every part of the steel as to present a most enduring and weather-gas-fume repellent surface. It is both corrosion-proof and rust-proof; it minimizes condensation and is unaffected by natural or artificial elements.

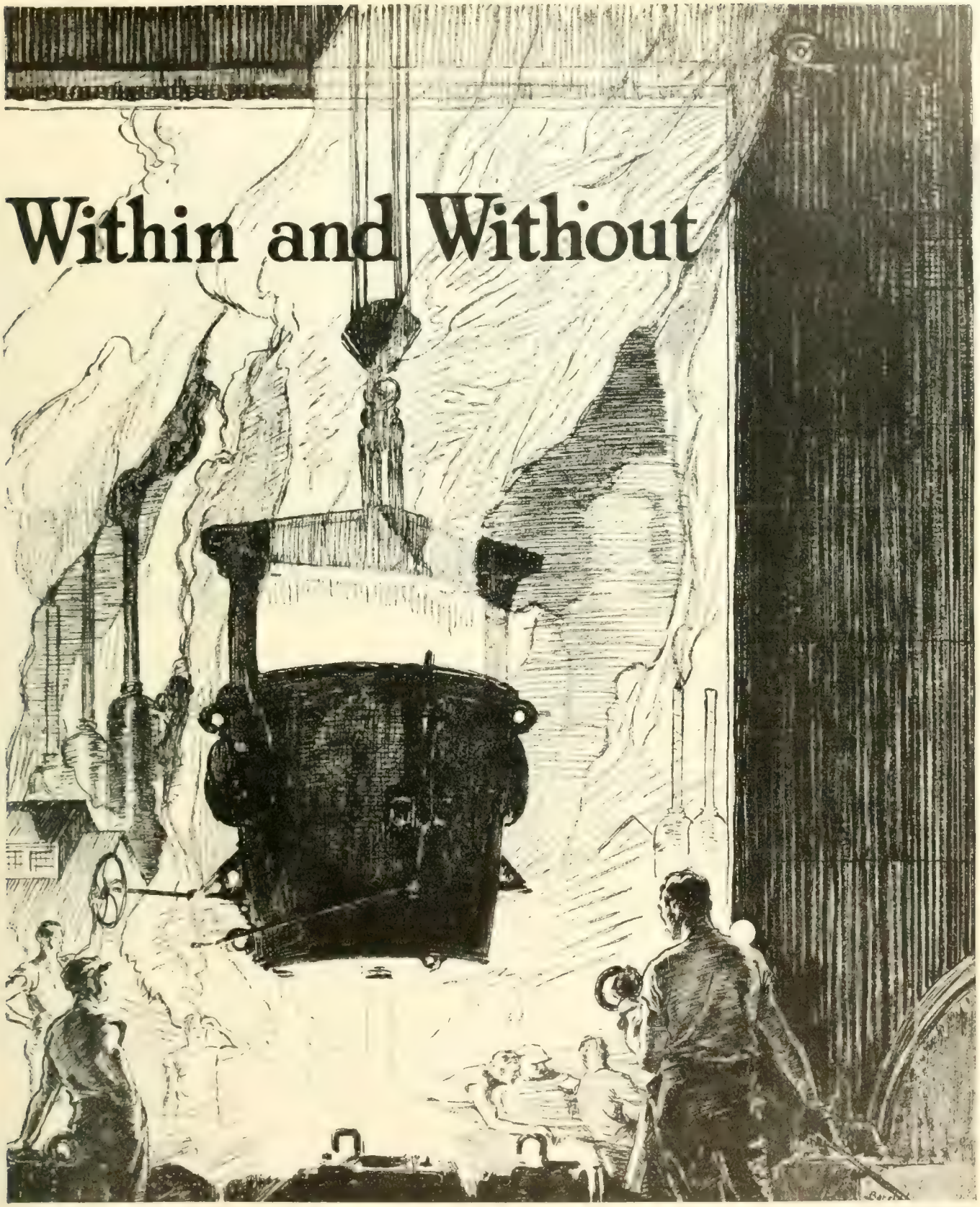
This process of protection is applied to the steel in sheets, and bars for use in roofing, siding, ridge-caps, gutters, downspouts and general building trim. Robertson Ventilators and Skylights owe their long life to the fact that they are made of Robertson Process Metal.

Special bulletins covering technical details relating to the three Robertson basic materials, Robertson Process Metal, Robertson Process Gypsum, Robertson Process Asphalt, and a General Booklet in which there are brief descriptions of all Robertson Products, will be gladly sent upon request.

H. H. ROBERTSON COMPANY, Limited
Sarnia, Ontario

Branch Offices: Toronto, Montreal, Vancouver

ROBERTSON
BUILDING PRODUCTS

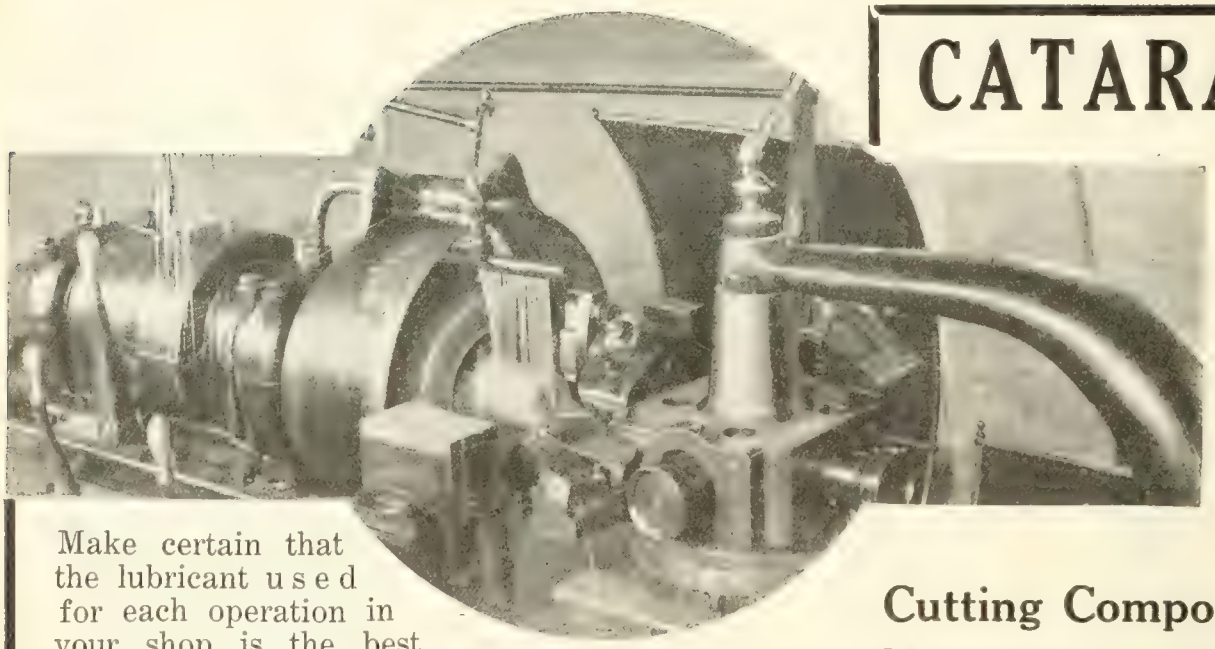


PROCESS

HIGHWAY MATERIALS

Trade Mark Reg. U. S. Pat. Office

CATARACT



ACME

MYSTIC

SPECIAL

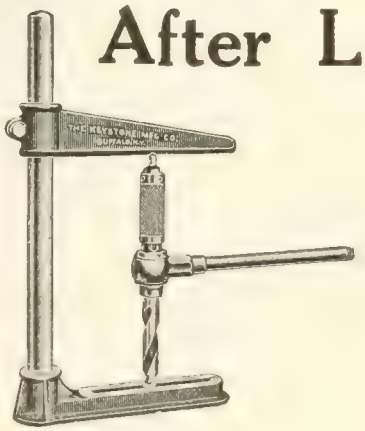
Make certain that the lubricant used for each operation in your shop is the best obtainable for the purpose. Otherwise your men and your tools and your machines work at a disadvantage.

Write us to-day that we may demonstrate how Cataract Lubricants can increase production and reduce cost in your plant.

Cutting Compounds
Drawing Compounds
Cutting Oils
Quenching Oils

Cataract Refining Company, Limited - Toronto, Ont.

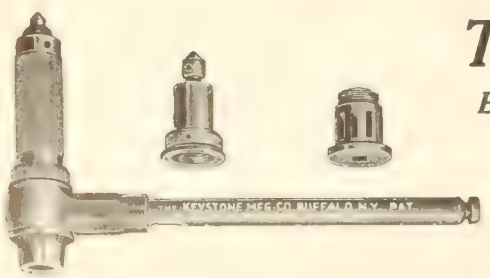
"Keystone Quality" Will Still be There After Long Use Has Worn Away The Name



We like to think of that.

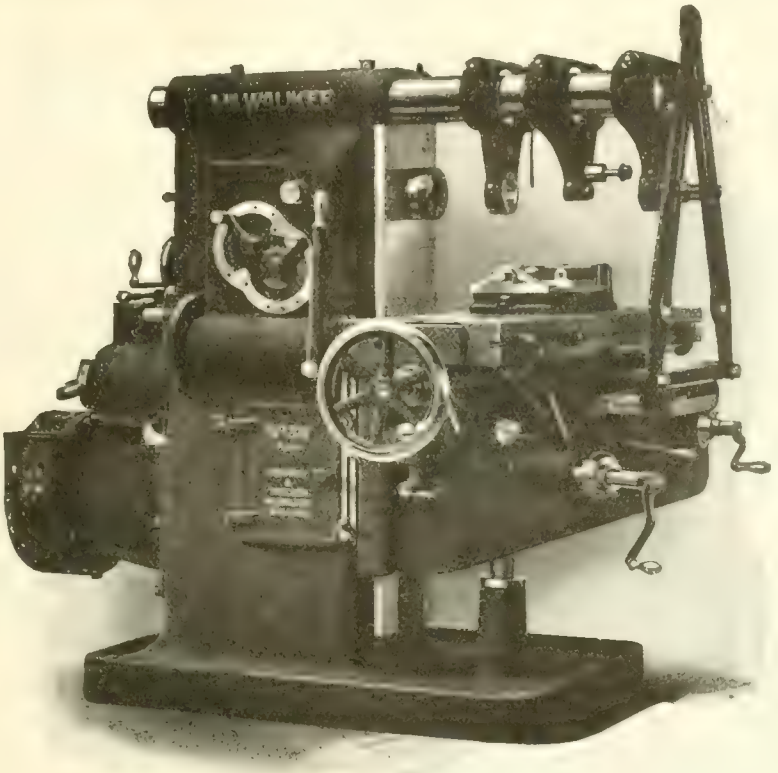
We like to think that the reputation of Keystone Tools is built upon a foundation of service with **Quality** the Keystone rather than a copyrighted name. For it is conceivable that imitators, or even the whims of courts, might rob us of our copyrighted name. But who could take "Keystone Quality" from Keystone Tools?

Write for name of nearest dealer.



The Keystone Mfg. Company

Buffalo, N.Y., U.S.A.



MILWAUKEE MILLING MACHINES

Double Overarm maintains alignment.

It is impossible for the operator to place the arbor supports on the arbor and double overarm in any other way than in line. Arbor cannot be pounded out of line when using large, coarse pitch cutters on rough, heavy work.

Other Distinctive Milwaukee Features:

Solid top knee—hardened steel gearing and shafts in the column and feed box—automatic flooded lubrication — one and one-half gallons of oil per minute pouring over all gears and bearings in the column and feed box, insuring lubrication at all times—flanged spindle with hardened steel collar for driving arbors—constant speed drive, reverse being self-contained.

Send for our No. 21 Catalogue. Illustrating and describing Milwaukee Milling Machines and accessories in detail

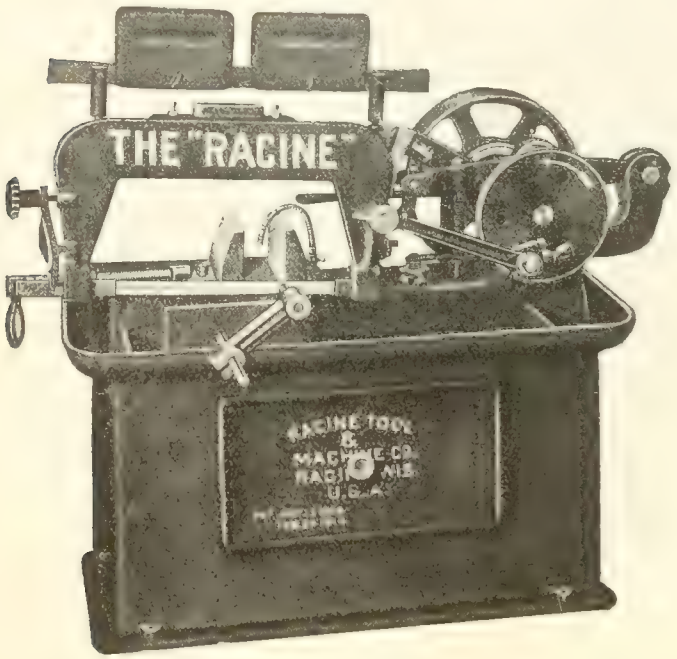
KEARNEY & TRECKER CO.

MILWAUKEE, WIS. U.S.A.

If interested tear out this page and place with letters to be answered.

Standard the World Over

"THE RACINE"



HIGH SPEED METAL CUTTING MACHINE

Reduces Blade Expense

Aside from its ability to turn out more work than any other metal cutting machine, "THE RACINE" will save you considerable money on blades alone—enough to pay for itself in a reasonable time. The automatic lifting device is responsible for that. It automatically raises the blade on the return stroke, relieving it of all dragging or strain. This also means quicker cutting, less power used and greater production.

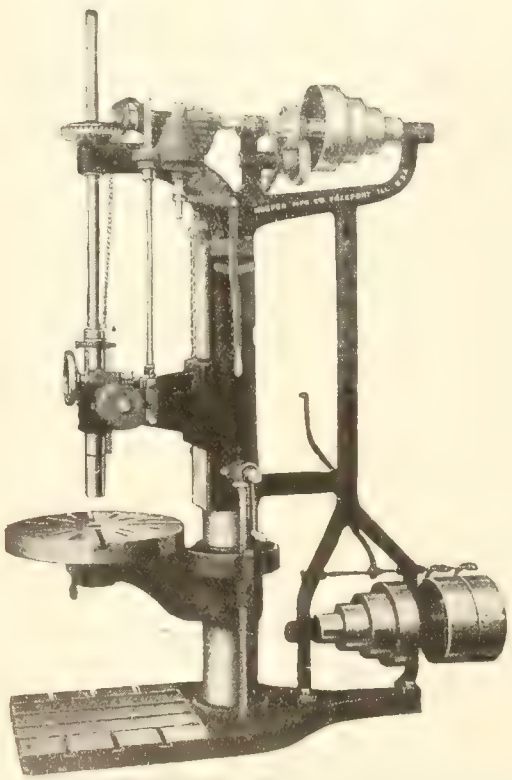
There are many ways "THE RACINE" will prove a big saving. Let us tell them to you.

Use "Racine" H.S. Tungsten Power Blades

Racine Tool & Machine Co.

Melbourne Avenue - RACINE, WIS., U.S.A.

The Driller for Exact Work



HŒFER

Enable Your Workmen to Eliminate Spoilage

The Hoefer Driller is pre-eminently the one to be found in the best plants. "It's almost as good as a Hoefer," so often heard in the machine and tool trade, indicates the position held by Hoefer Drillers.

Exact drilling, to the last thousandth of an inch, pays by eliminating spoiled material. Hoefer Drillers pay for themselves and increase the workman's pride in his work.

Twenty-five Years on Market

Twenty-five years making drillers has given Hoefer the "Know-how." The Hoefer Drillers are used by many of America's leading manufacturers. Equip your factory the Hoefer way. Take any kind of a drilling problem you have to the Hoefer Manufacturing Company, and the Company's experts can tell you how it was solved by other men, some of whom you may know.

Investigate now. Write to-day for catalog. The Hoefer engineers are at your service.

HOEFER MFG. CO.

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Perfect Riveting

Provided its cost is the lowest possible, riveting so well done that it can't be improved upon, is perfect riveting.

Boys on Grant Riveters accomplish two and three times as much perfect riveting as an equal number of men using ordinary machines.

With the

GRANT

ROTARY VIBRATING RIVETER

rivets placed close up to the shoulder of the work are as rapidly spun perfectly smooth as are rivets in easy-to-reach spots.

The Grant Mfg. and Machine Company

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Send for "Perfect Riveting"

Harris Heavy Pressure

The Babbitt Metal that's at the Front in Efficiency and Economy

Order a Box from our nearest Factory

Our Guarantee is Back of Every Pound of Babbitt Metal We Make

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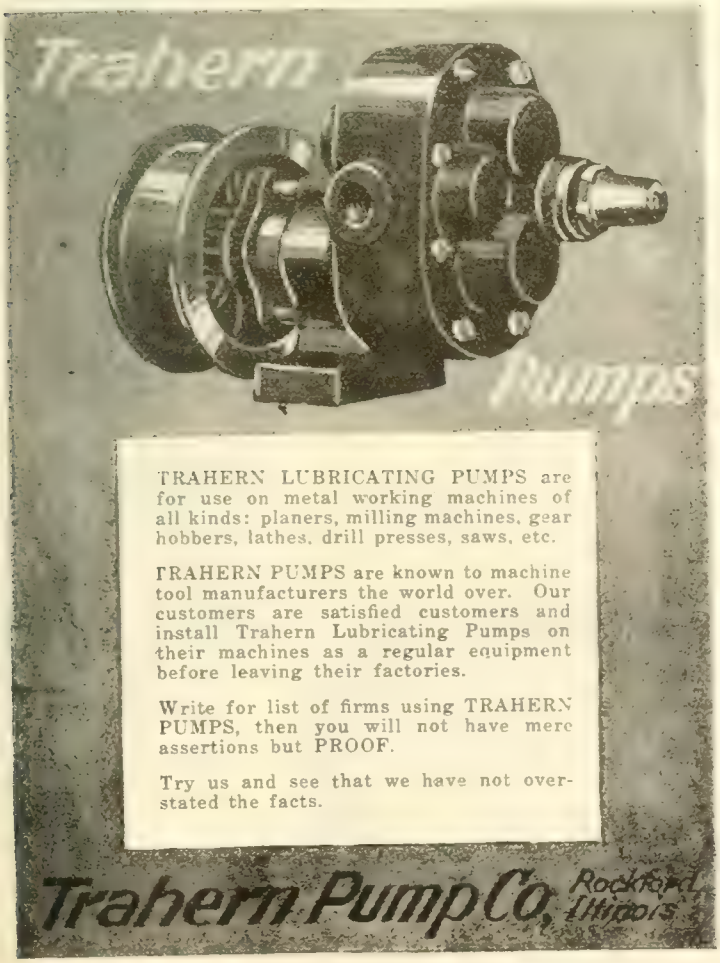


TRAHERN LUBRICATING PUMPS are for use on metal working machines of all kinds: planers, milling machines, gear hobbers, lathes, drill presses, saws, etc.

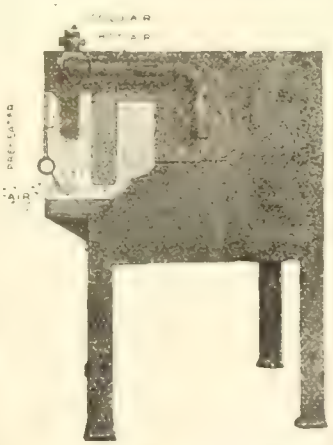
TRAHERN PUMPS are known to machine tool manufacturers the world over. Our customers are satisfied customers and install Trahern Lubricating Pumps on their machines as a regular equipment before leaving their factories.

Write for list of firms using TRAHERN PUMPS, then you will not have mere assertions but PROOF.

Try us and see that we have not overstated the facts.

Trahern Pump Co. Rockford, Illinois

ECONOMIZER FORGE



It is economical in fuel, air and power; protects workmen from flame and hot gases and the heated material from oxidation or scale; increases the quantity and improves the quality of heated products; prevents smoke, flame and heat escaping into the forge shop.

Showing deflection of hot gases with induced air *toward* the furnace, and the preheating of air for combustion.

Write to-day for catalogue 34-T

Canadian Representative:
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"FURNACE AND FUEL TO SUIT ALL WORK"

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"The Marshalltown Throatless Shears"

guarantee perfect work at less than half the ordinary expense.

Rotary, self-feeding shears designed for cutting in and out curves, straight or irregular shearing, circles, also beveling and splitting of plates. Built in various sizes having capacities from tin up to ½" thick. No limit to the size of sheet being cut. Hand, belt or motor drives. The last word in metal cutting shears. We also manufacture Rotary Bevel Shears, Splitting Shears and Plate Milling Machines.

Let us know your requirements.

Marshalltown Mfg. Co.
Marshalltown, Iowa
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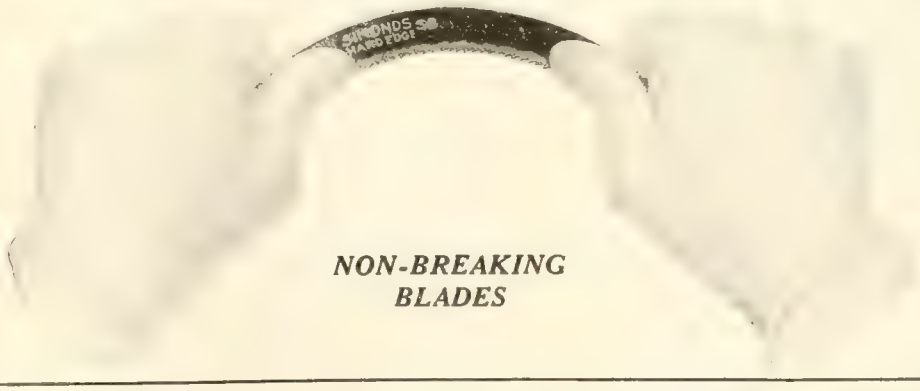

NON-BREAKING BLADES

CUT CUTTING COST

For Machine or Hand Use
Any Size or Length

Simonds Canada Saw Co.
LIMITED
MONTREAL
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WINNER
of the
LONG SERVICE MEDAL
For Bearings in High-Speed, Heavy-Duty Machinery

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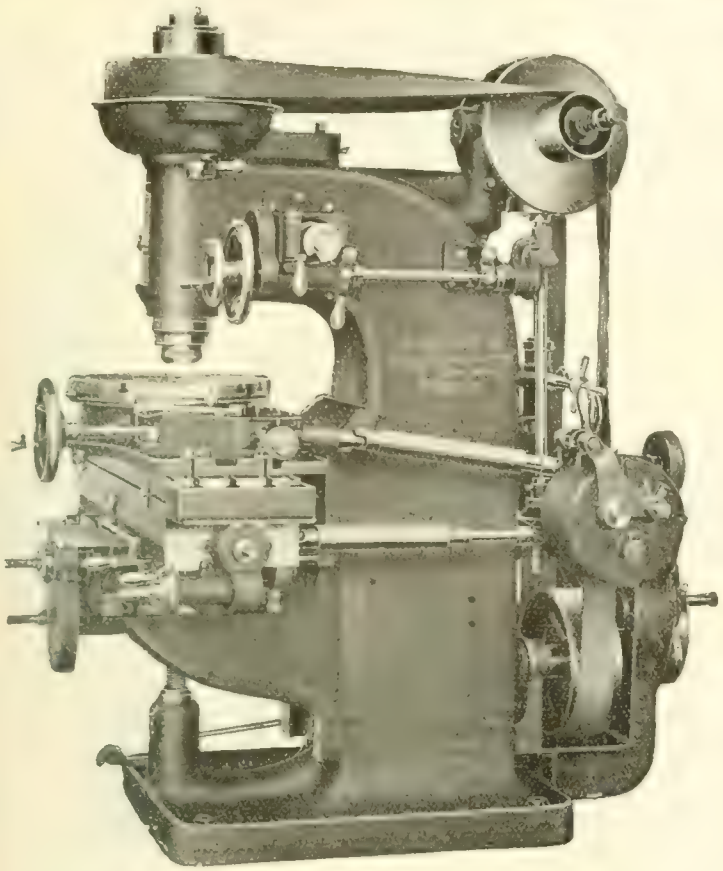


BECKER
BELT DRIVEN
MILLERS

"THE MACHINE THAT GIVES THE SMOOTH FINISH"

All gear driven spindles lack flexibility and induce vibration through the unavoidable progressive development of back lash between gears resulting in vibration and hammer action which has a crumbling effect upon the cutter teeth and leaves chatter marks on the finished work.

With the Becker Elastic Belt Drive this gearing is eliminated.

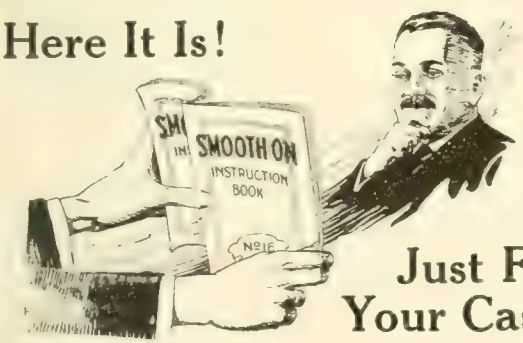
Write for Circular 0-702.

Becker Milling Machine Co.
HYDE PARK, BOSTON, MASS.

A. R. Williams Machinerr Co., Ltd., 64 Front St. W., Montreal
Rudel-Belnap Machinery Co., Ltd., - 137 McGill St., Montreal

SMOOTH-ON IRON CEMENTS

Here It Is!



Just Fits Your Case!

Many engineers have learned by experience not to say "That will have to come down for repairs," until after they have tried SMOOTH-ON IRON CEMENT. For SMOOTH-ON saves dismantling in a large proportion of cases.

Smooth-On Instruction Book No. 16

Its 144 pages contain descriptions of many instances of time and money saved in this way. It shows you "how it is done"—**quickly and economically**—without dismantling machine or piping.

Write today for your copy.

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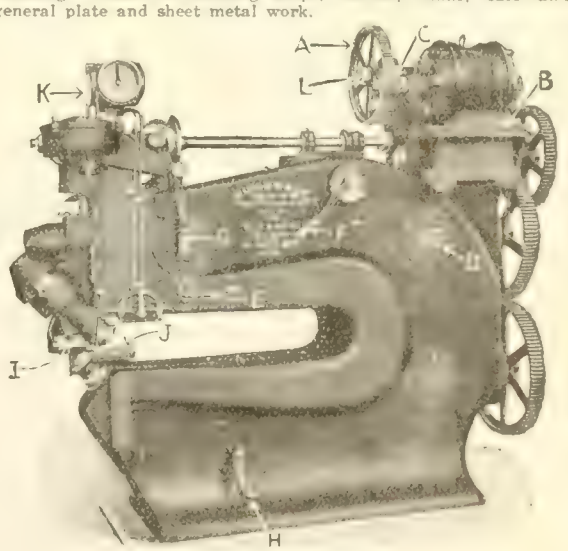
Registered in U.S. and Foreign Countries.

ROTARY SHEARS
MADE IN 7 SIZES.

Cut all gauges of sheet and plate metal up to 1 inch thick in straight or irregular shapes and openings without cutting in from side of sheet. Leaves square, true edge that requires no finishing. Used in building ships, boilers, tanks, cars and general plate and sheet metal work.



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SAVES 50% TO 90%
Eliminates Oxyacetylene Cutting and Plate Planing.
Write for Catalogue No. 60.

THE QUICKWORK COMPANY, ST. MARYS, OHIO, U. S. A.
Cable address: "QUICKWORK."
Codes: W. U. and General.

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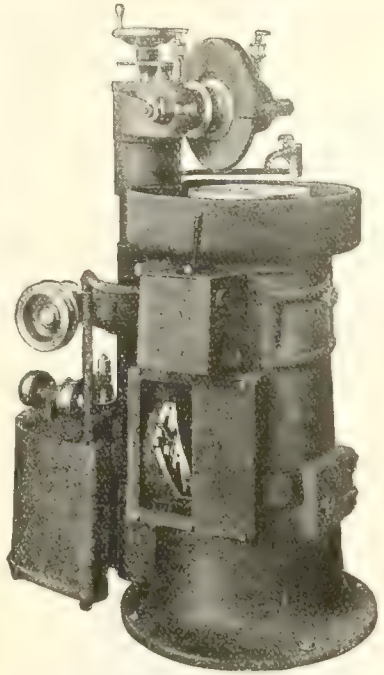


BRISTOL

Bristol 12-inch Rotary Precision Surface Grinder

Built for rapid production on grinding work.

It handles work either singly or in multiples within the capacity of the chuck and not thicker than 6-in., and grinds within quarter thousand in. of manufacturing accuracy.

And it is built to last.

It is provided with exceptionally long bearings throughout, especially in the back column. This prevents the wear, which is very slight, from affecting the accuracy of the grinder. The Back Column is made to swivel four degrees, which allows concave or convex grinding.

Bristol Rotary Surface Grinders are made in several types and sizes and are regularly equipped with 8-in., 12-in., and 16-in. magnetic chucks, either belt or motor driven and for dry or wet grinding.

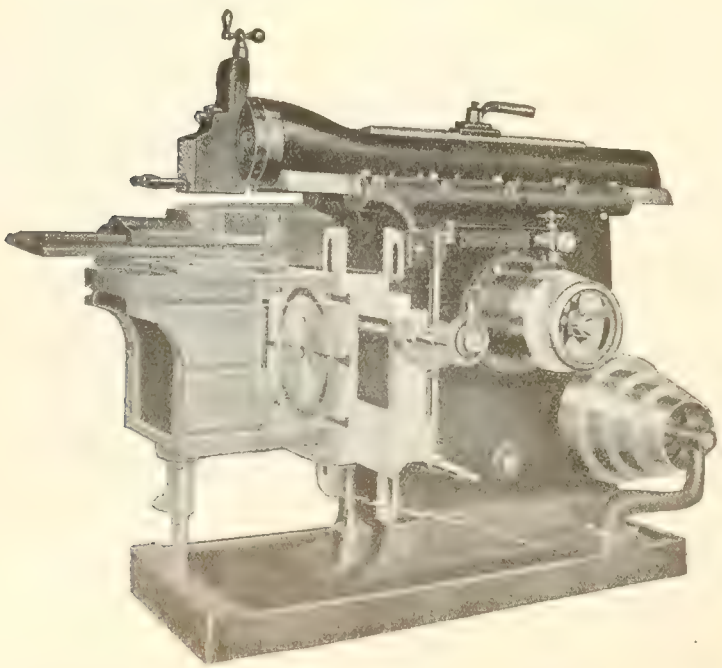
Our Bulletin describes the many good points fully. Send us your name and address and we'll gladly mail you one.

Grinds within .0004 in. of absolute Accuracy

BRISTOL MACHINE TOOL CO.
SUCCESSORS TO C. G. GARRIGUS MACH. CO.
BRISTOL, CONN.

Milwaukee Shapers

Are Needed in Up-to-Date Canadian Shops



A line that is unexcelled in Rigidity, Accuracy, Power, Simplicity and **Production.**

Built in three sizes: 16 inch, 20 inch and 24 inch.

Write for descriptive Bulletins.

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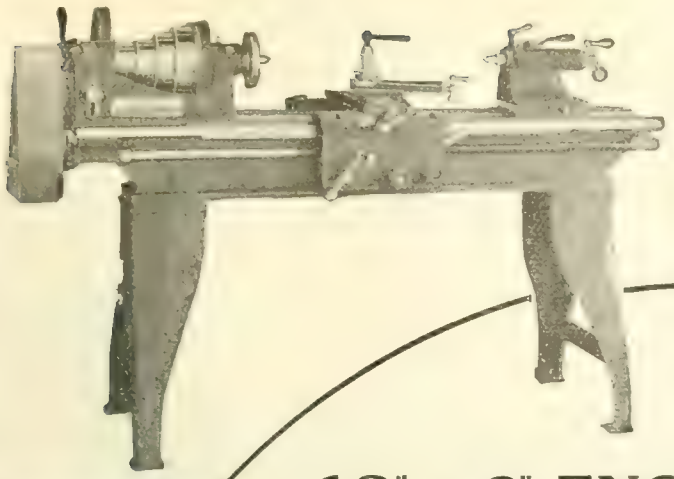

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13" x 6" ENGINE LATHE—

AN EXCELLENT TOOL FOR GARAGE WORK

It is a very satisfactory lathe for garage service because of its simplicity, the various attachments available and exceptional wearing qualities.

"Star" Lathes are economical. They do the work of larger and costly machines at a much lower cost and with greater accuracy.

May we send descriptive circular?

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366 W. Falls St., SENECA FALLS, N.Y.

Production of Rare Quality at Lowest Labor Costs

There is unusual strength, accuracy, speed, convenience and range in

AURORA

Drilling Machines

You can use them to great advantage on any work in your shop that's suitable for a machine tool of this kind. The operating is easy and the labor cost comparatively low.

Drop a line for full particulars and specifications.

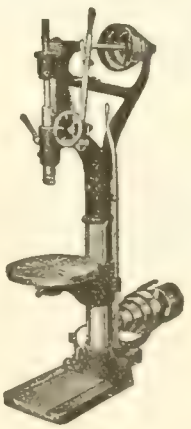
Stationary Head Sizes 20"—21"
Sliding Head Sizes 22"—44"

The Aurora Tool Works

AURORA, INDIANA, U.S.A.

The BARNES DRILLS

TRADE MARK



Complete line. 8-inch to 50-inch swing

Gang Drills.—Horizontal Drills.

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104 Ruby Street - ROCKFORD, ILL.

Canadian Agents—A. R. WILLIAMS MACHINERY CO.
Toronto, Winnipeg, Vancouver, and St. John, N.B.
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If You Want Production--

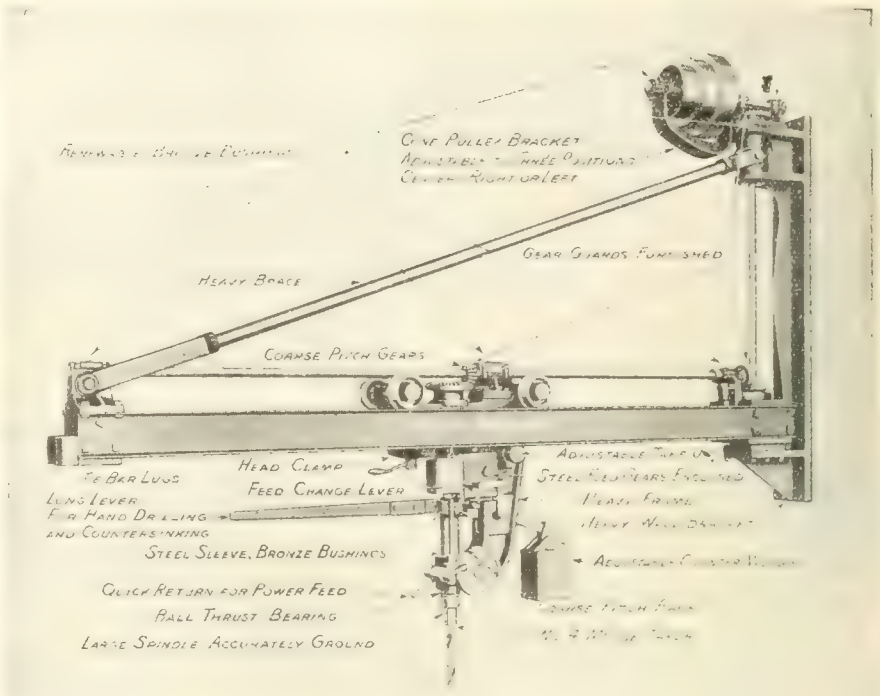
You can't do better than install this Wall Radial Drill in your plant. We'll say you won't have it in operation more than a month before you will begin to congratulate yourself on your judgment in adding this machine to your equipment. Materials and workmanship that you can depend upon to the limit are features of the construction, and our bulletin will give full details.

GET IT TO-DAY!

MADE IN FOUR STANDARD SIZES.

Rated size	Drills to centre of	Wall to end of arm
7 ft.	14 ft. circle	10 ft.
9 ft.	18 ft. circle	12 ft.
11 ft.	22 ft. circle	14 ft.
13 ft.	26 ft. circle	16 ft.

F.O.B. Boston, Mass.



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Wire Cloth

of every description

We make **Machinery Guards** of all kinds.

Metal Lockers for Clothes.

Overhead Wire Guards for Elevators.

Drop a line for full details.

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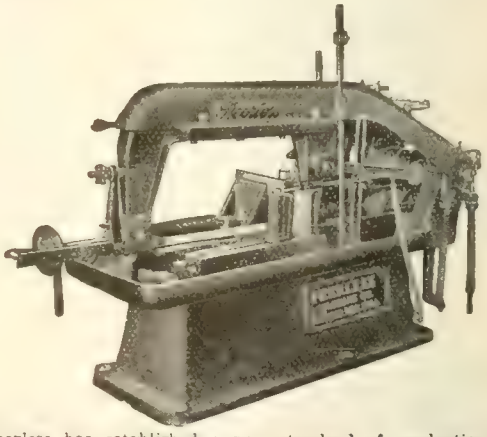
Would you like to have us prove that

Peerless HIGH SPEED

Machines do 50 to 100% more work



The Peerless has established a new standard of production in so many plants that we are ready to ship one at our expense and risk, if you agree to give it a thorough test. A trial like this often results in our selling from 1 to 10 machines.

The Balance Lift of the Peerless

automatically raises the blade for the return stroke. This greatly prolongs the life of the blades, economizes power, and increases production. There are more good features which we shall be glad to acquaint you with.

The Peerless assures you the peak of production at very lowest cost. Write for full details.

PEERLESS MACHINE CO.

1607 RACINE STREET RACINE, WISCONSIN

If what you need is not advertised, consult our Buyers' Directory and write advertisers listed under proper heading.

Wherever Pipe is Cut or Threaded Economically

The probability is two to one that it's a

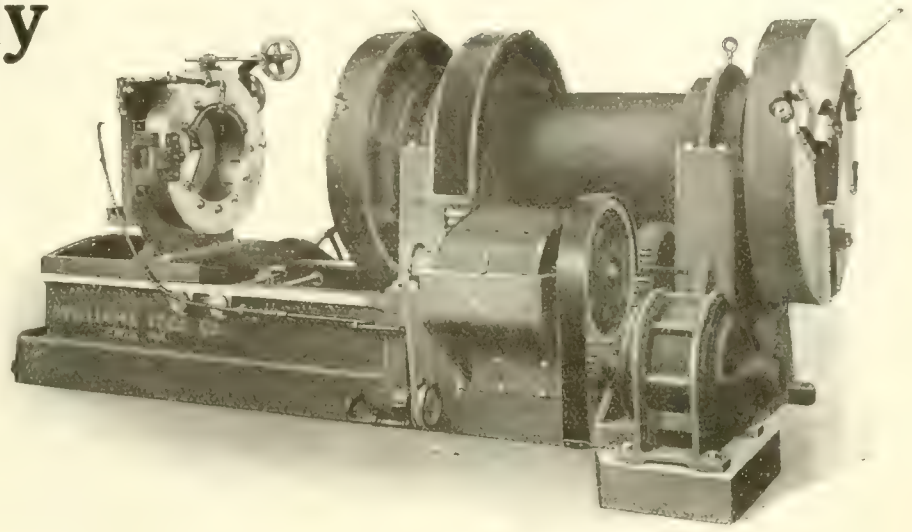
Williams Pipe Machine

that's on the job.

For in approximately two-thirds of all the larger plants in this country Williams' Pipe Machines are used.

It was the Williams Pipe Machine that brought highest honors home from the Panama Exposition.

The Machine illustrated has a capacity of 21½" to 12". Also nine other sizes to meet your requirements.



Write

Williams Tool Company

Erie - Penn. - U.S.A.

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DUNBAR SPRINGS

ACCURACY ASSURED

You can always depend upon Dunbar Springs being accurate. Before proceeding with any order the first few springs are carefully tested and checked up for this very purpose.

Seventy-two years' experience making flat and spiral springs of every description enables us to furnish you with springs of the highest quality, that can be depended upon under all conditions.

Send blue prints for estimates.

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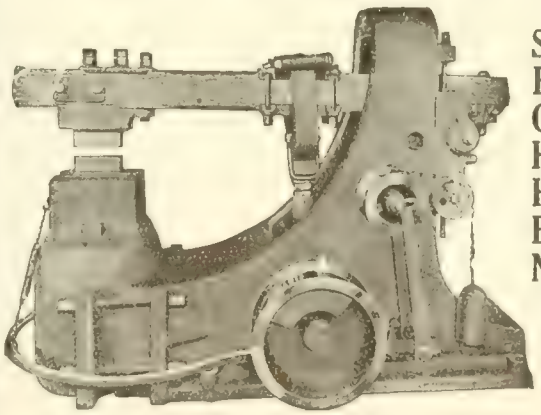

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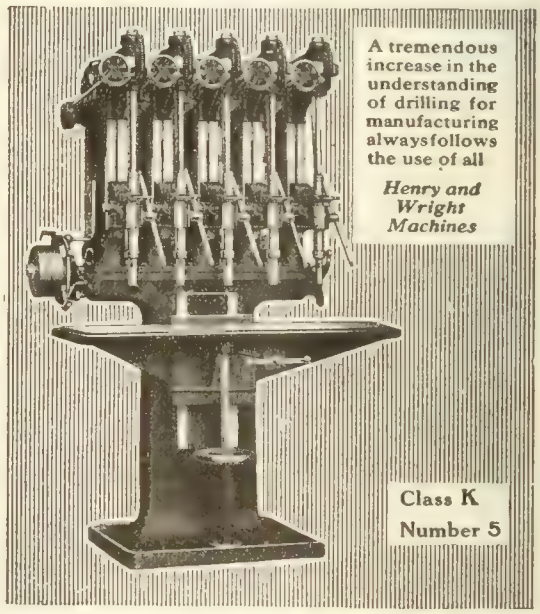
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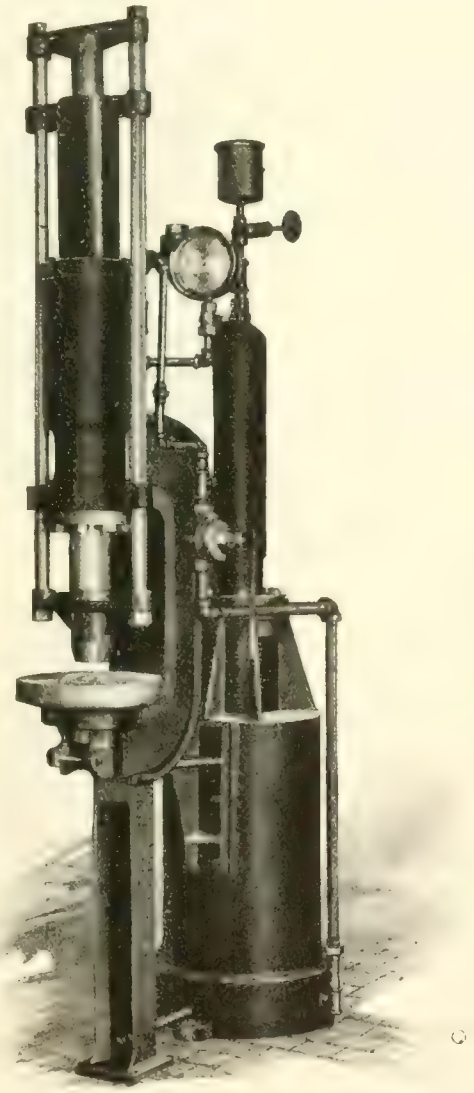

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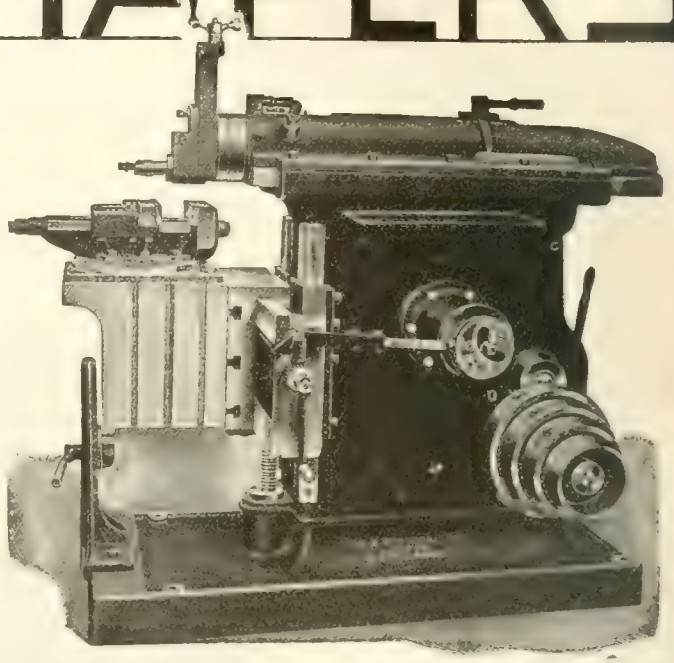

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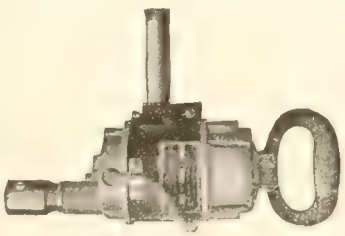

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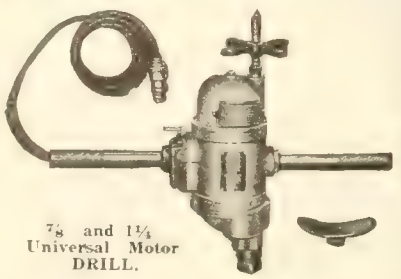

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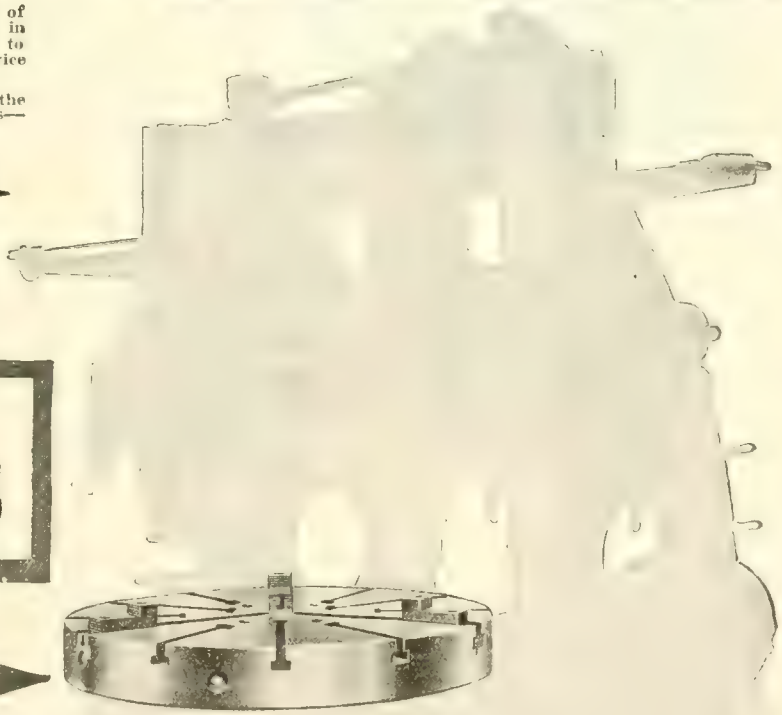

THE TABLES

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CANADIAN MACHINERY
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Vol. XXI. No. 21 November 27, 1919

Broaching as an Aid to Greater Production

The First of a Series on the Above-Mentioned Subject. The Tools Used on Such Work, Together With Definite Practical Data Concerning the Same Will be Given

By FRANK H. MAYOH

BROACHING holes and broaching outside or inside shapes is now the most economical method of machining many parts which were formally considered of impractical design. Taking advantage of this, it is possible for a designer to make many parts which have had a tendency to slip of such a shape that they are positive in their action without additional cost to manufacture, and in fact these are often manufactured more economically.

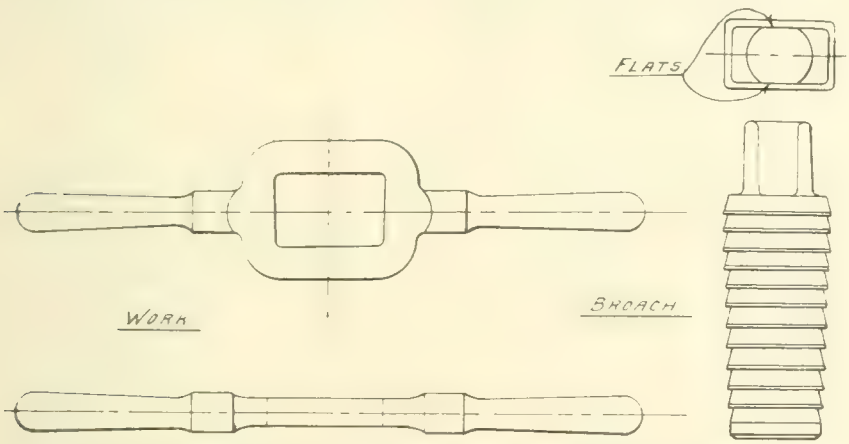


FIG. 1. WORK AND TYPE OF TOOL USED FOR PUSH BROACHING.

The Old Style Machine

Drifting back into ancient history I recall a big, rugged machine, formidable in appearance, placed out of the way, that was run about one month a year and shook the whole shop. No one knew much about this machine, it was something of a mystery, but it was nothing more than a big, clumsy press, used for push broaching the part shown by Fig. I. The press had a short stroke and, of course, the broaches were short and stubby, as shown, but nevertheless they did a good job, and by referring to Fig. 2, some idea of the class of tools used for this purpose may be had.

The fixture for holding the work is made of cast steel and is bolted to the platen of the press in the usual manner, while two plates, A and B, locate the work sideways and square it up, two plates, C and D, located the work endwise. At the right of this illustration the broach holder is shown, this fits into the ram of the press and is held there by a wedge. The shank of the broach (illustrated with the work in Fig. I), fits into the hole of this holder, while two plates, E and F, square the broach with the work holder, when these are properly located on the machine. Five short broaches were used for trimming out this hole from the forging size.

As a general thing, push broaching is not as satisfactory as pulling the broach through the work, and most broaching machines are based on the latter principle.

Designing the Broach

The correct design of broaches is a high-grade art, requiring good judgment, and one of the purposes of this article is to present examples and constructional details used in their manufacture and operation.

Referring to Fig. 3, the tools necessary for pull broaching a key-way are shown. These consist of a broach A and a work bushing B, while oftentimes it is necessary to make a broach holder having a substantial means for gripping the broach in the tool slide of the machine. The amount of stock to be removed by each tooth of the broach must be decided upon, and likewise in deciding the pitch of the broach teeth it must be coarse enough to allow the chips to lie in the space between the teeth, this

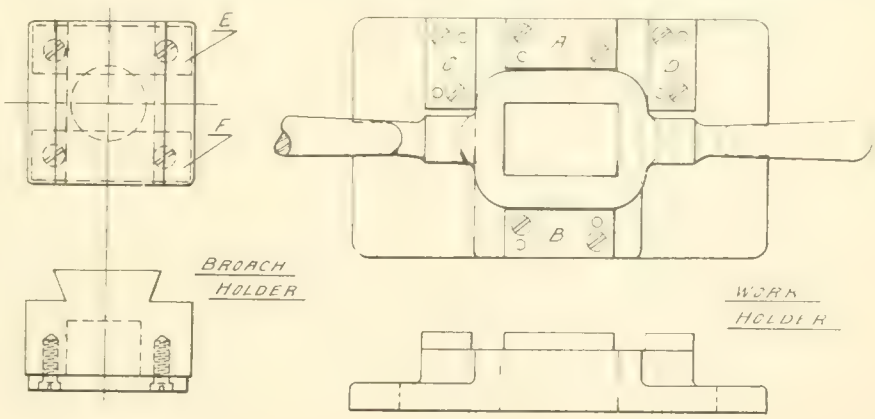


FIG .2—TOOLS USED IN CONNECTION WITH BROACHING THE PART SHOWN IN FIG. 1.

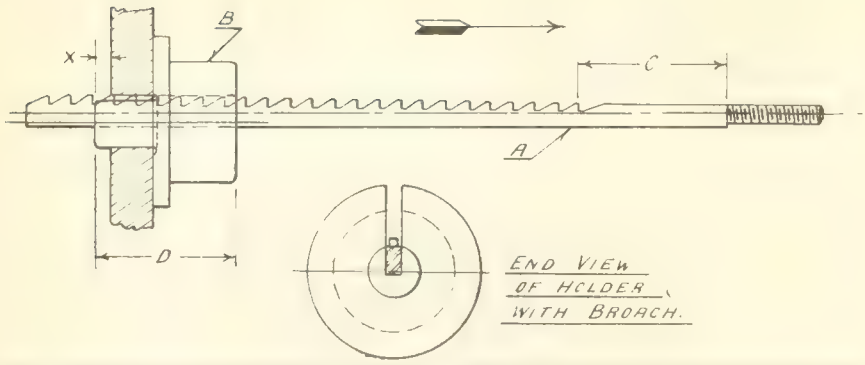


FIG. 3—TOOLS FOR BROACHING A KEYWAY, USED ON DRAW BROACHING MACHINE.

depending on the length of the work. Having determined on the broach teeth the length of the broach is governed by the depth of the key-way, but in addition to this there are two other conditions which are quite apt to be overlooked, either of which might prove fatal to the operation of the broach. The first of these is the length C, which must be added to the length of the broach and is at least equal to the length of the work bushing D. This permits the broach to be passed through the work and into the holder without the teeth of the broach interfering or coming in contact with the work. It will be noticed on the illustration that there is a distance X between the work and the end of the work bushing. The importance of this added length is often overlooked, but as a protection against broken broaches it is "insurance" at its best. The reason for this is apparent from the diagrams, Fig. 4. For if the work bushing comes flush with the end of the work, when a tooth of the broach starts to cut, there is a breaking point X directly opposite the tooth; should the work bushing be shorter than the work, the tendency to break the broach at this point is aggravated, while if the work bushing is longer than the work, as shown at the right in Fig. 4, the broach is properly backed up while cutting and consequently is not apt to break from bending strain.

A common error in laying out work which is to be broached is to assume that because a broach is listed to cut a key-way so wide and so deep, it will do it, for if the broach was designed for short work and an attempt is made to use it on long work, the chances are the broach will be broken, although the operator can not be blamed for doing what the operation list called for, and therefore lists of broaches should specify the maximum and minimum length of work for which best adapted.

Various Styles of Holders

The illustrations, Figs. 5, 6, 7 and 8 show a number of pull bushings or broach holders which are adaptable for most work, the object of these being to grip the shank or threaded portion of the broach securely, so the same may be pulled through the work.

Referring to Fig. 5, the upper views show a plain holder having a screw A with a shoe B in a holder C, which are used for locking the broach in position after it has been screwed into the holder. This holder is gripped by the large threaded end in the tool slide of the machine.

Below this is what is known as a floating holder and the portion D of this is similar to the one above, except that the shank, instead of being threaded, has a bell-mouthed hole E in it. This shank is a floating fit in the holder F, which has a pin G in it to keep the holder D in place. The holder F is attached to the tool slide of the machine and this whole arrangement makes a suitable means for allowing the broach to fit in a bushing at the work end of the machine without being rigidly attached to the drawing end of the machine, where such an arrangement is desirable. An arrangement for pulling the broach which may be used when the broach is very small and the cutting is light is indicated in Fig. 5, as "Holder with binding screw," and the construction of this is obvious from the illustration as the shank of the broach is simply flatted at H against which the screw J is caused to bear.

The illustration below this also shows a holder suitable for light work, and besides the threaded end for holding it in the tool slide two pivot point screws K and L are provided, which are adjustable and hold the broach while it is pulled through the work. A good rugged arrangement for holding the broach is the wedge construction shown in this illustration. In this an elongated hole is cut through the broach and an elongated hole is cut through the holder, through these a tapered wedge is passed, from which it is almost impossible for the broach to pull away. Some very substantial broach-holding arrangements are illustrated in Fig. 6, the first of which, with the split bushing arrangement being a very simple means of securing good results, as it combines a solid pull arrangement with easy removal of the broach. It is necessary in this construction to have the distance A greater than the length of the bushing B, and the broach C is provided with a head D. In operation the two halves of the bushing are put over the shank of the broach through the hole A; the broach with the bushing in place is then pulled back until the bushing is in the hole, as shown, and takes the pull of the cut.

The view in the centre makes a neat arrangement of a substantial floating holder and is constructed as follows:

The broach E is threaded at the end and a nut F is screwed thereon; this nut has a radius at one end which comes against the screw bushing G; this screw bushing, after being screwed in place by means of the squared end, is locked by the screw and shoe H, while the holder itself, J, is held to the tool slide in the usual manner. The hole in the threaded bushing is slightly larger than the broach shank, which with the radius on the nut makes a holder having a little float.

Revolving Broach Holder

A revolving broach holder suitable for use where it is necessary that the broach revolve, as in broaching spiral keyways, has been shown at the lower part of Fig. 6. The broach holding portion proper is designated as K and the broach L is threaded into this; to prevent the broach from unscrewing out of this holder a key M is provided and a screw N forces this key down into the keyway and binds it there, thus locking the broach securely. The holding portion K has a head on it, P, which bears against a thrust washer, Q; a ball bearing, R, then takes the thrust of the cut, while the plate S holds these in place in the holder T, the plate being held in by the screws U. In pulling a spiral broach through work it is customary to cause the broach to revolve at the work end of the machine, which makes it necessary to arrange the holder so it will pull the broach and revolve at the same time, which condition is very well taken care of by the ball bearing thrust washer and the arrangement shown, while the principle involved will

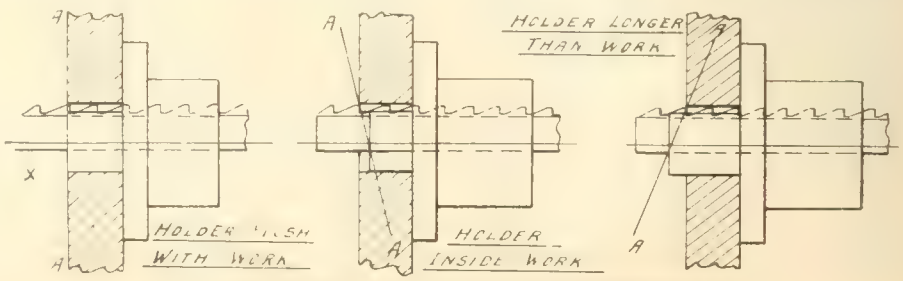


FIG. 4 THREE EVTMPLES OF WORK HOLDERS.

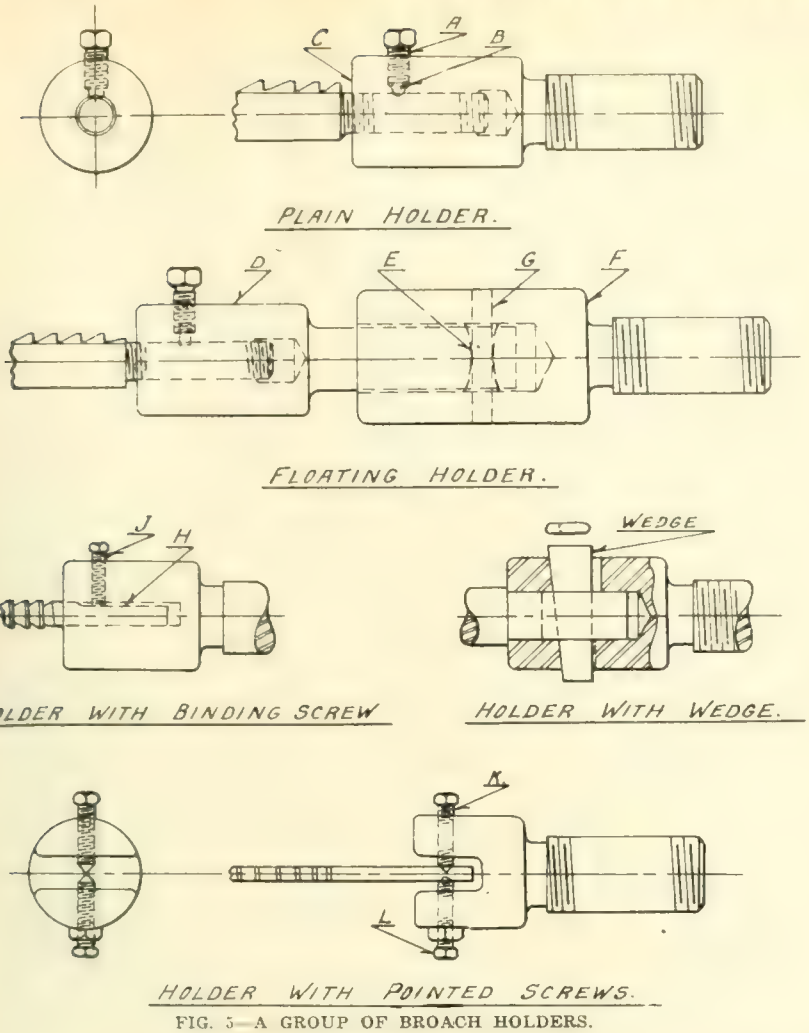


FIG. 5—A GROUP OF BROACH HOLDERS.

be illustrated in an example of spiral broaching in a later illustration.

Figure 7 shows a split pin arrangement for holding a broach and this pin is best likened to a clothes pin, as it slips over two flats on the shank of a broach in much the same manner as a clothes pin would over a line. Referring to the illustration, A is the broach, B is the split pin, C is a pin used for pulling the split pin in and out of the hole, while D represents the flat on the broach, and E the broach holder proper. In operating this, the broach is slid through the work and work bushing into position in the holder, the split pin B is then pushed in place over the flats D, where it takes the thrust of broaching.

In the lower portion of Fig. 7 a holder where the broach F is threaded directly into the holder is illustrated. This holder is split at G and ring H, with a screw J, is used to pinch this holder together and bind the shank of the broach.

Another example of a split pin arrangement is illustrated in Fig. 8, where the pin and holding means are the same as that shown in Fig. 7, except that at the closed end a spring is located in place of a pin. This spring X is made of flat stock and is used to hold the pin in place and it is particularly useful where the holder has to revolve as the spring clinging to the holder keeps it in position, even though the spring end should be on the under side.

The lower illustration in Fig. 8 shows a latch method of holding a broach while it is drawn through the work; this method, while not as rigid as some, is quick operating where the broaches have to be removed continually. The broach A has a notch B cut in it and the holder C is constructed with a cap D on it, a slot E in the holder contains a lever F, which is free to pivot on the pin G; four screws, H, hold the cap in place. Other features of this holder are the spring pin J and the binding screw K, which has a handwheel L on it, while a screw M keeps the spring N in place to operate the spring pin. In operation, when the screw K is released, the spring pin J forces the hooked end of the lever out of the slot in the broach and the broach can then be pulled out of the holder, while the reverse of this, of course, locks the broach in place.

In push-broaching the broach holder may usually be of very simple design, such as a pad to fit in the hole of a press, as shown at A, Fig. 9, which pushes the broach through the work, or the holder may have a groove for locating the broach in its proper radial position, as shown at B. For some jobs it is desirable to support the upper end of the broach in a holder similar to C, Fig. 9, while a ball bearing pad, which revolves when a spiral broach is being forced through a hole, is illustrated at D.

Work holders for broaching are, of

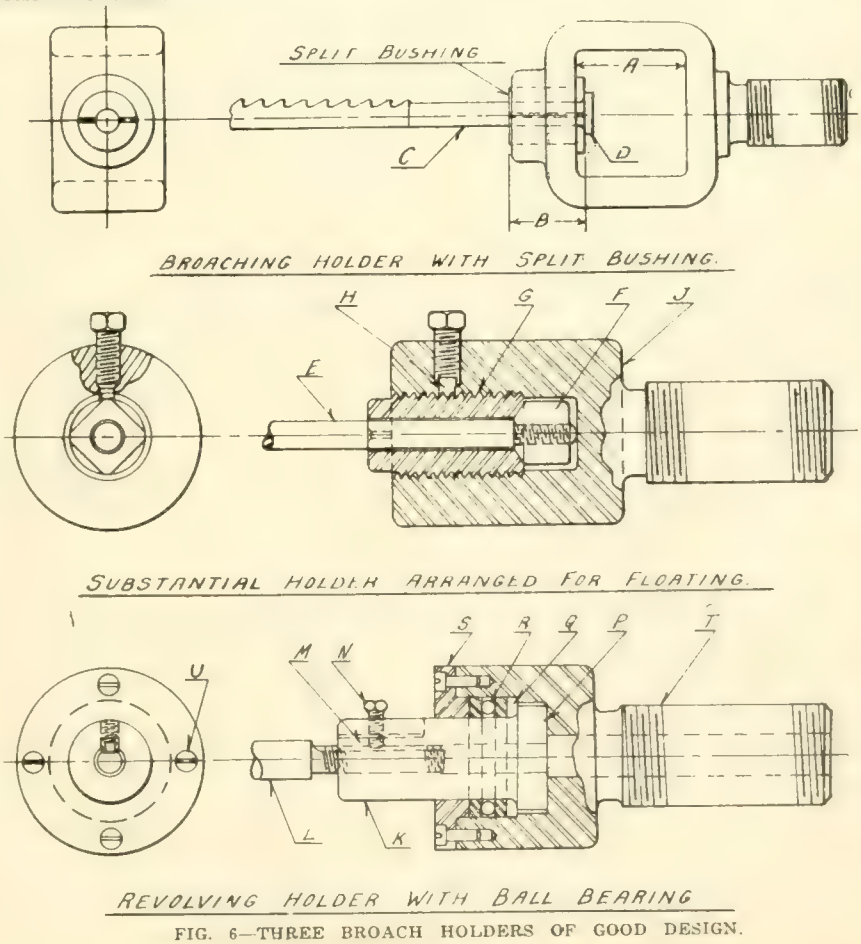
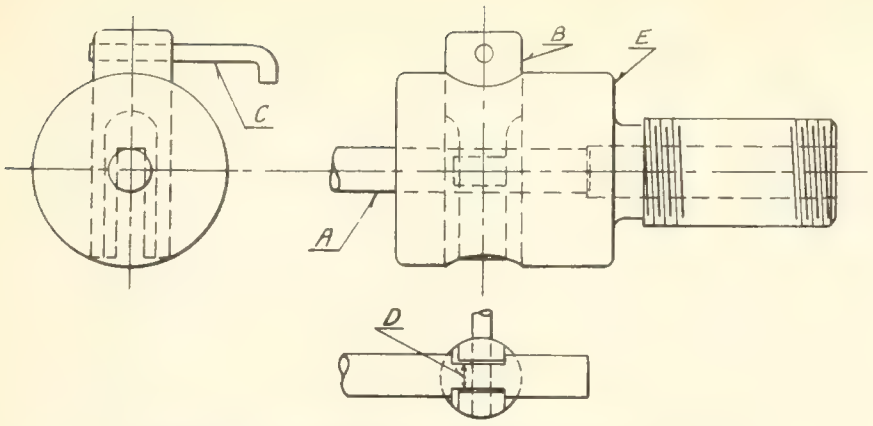
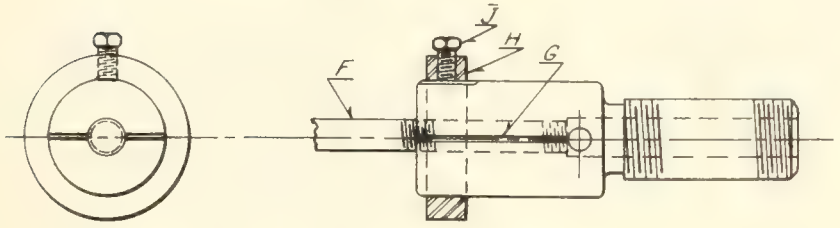


FIG. 6—THREE BROACH HOLDERS OF GOOD DESIGN.



METHOD OF HOLDING BROACH WITH PIN



SPLIT CLAMP BROACH HOLDER.

FIG. 7 - SLIP PIN AND THREAD BINDING BROACH HOLDERS.

course, quite numerous, they being designed to suit individual and varied conditions, and therefore a few typical examples covering general requirements are all that will be shown here.

Basic Features Involved

The basic features of a work holder are that it must support and locate the work, guide and often back up the broach, while economical production demands that it be as simple as possible, consistent with the required accuracy of the work.

Referring to Fig. 10, the first illustration shows a work holder for broaching a plain bushing. This holder consists of portion A, which fits the machine and a stem B, upon which the work is placed, while the slot, of course, guides and backs up the broach. Where the work broached is small, this work holder is usually made in two parts, and such a holder is shown below the one just described, where C fits the machine and D holds the work. In the view at the upper right-hand corner the bushing E also has a small work bushing F inserted in it, this latter bushing being set below the centre, so as to bring the broaching tool in line with the screw of the machine. The view below this shows a bushing for broaching a keyway in a tapered hole, where it will be noticed the end of the holder G is machined so as to hold the work on an angle so the keyway will be broached in line with the hole.

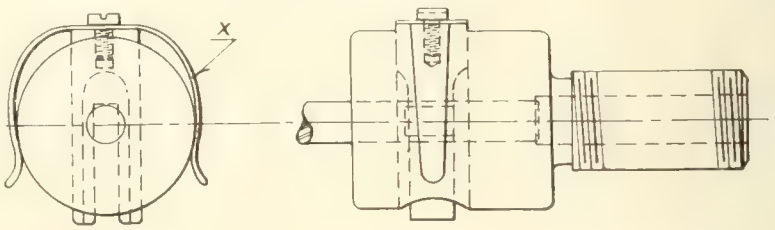
The lower illustration shows a large holder, H, in which is held six small holders, J, upon which are placed six parts, while keyways are simultaneously broached in them.

In Fig. II, a complete work holder for handling the part shown consists of a cast iron portion A, in which is inserted a steel locating bushing B, while two pins, C, locate the arm, so the keyway will be broached in the proper relation to match with this arm when assembled in place. Having determined on the method of holding the work and the means of pulling the broach, the design and proportioning of the broach is the next consideration, and while a faulty work or broach holder will often break a broach, the design of the broach determines the quality of the work produced and the wearing qualities of the broach to a large extent.

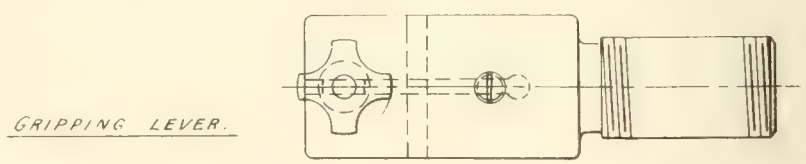
In describing broaches the object will be to show successive steps in their design, as the broach cuts up to the form desired from a blanked or starting hole, and as a prelude to this reference is made to Fig. 12, which shows proportions for broaches that have been quite generally accepted.

The Teeth

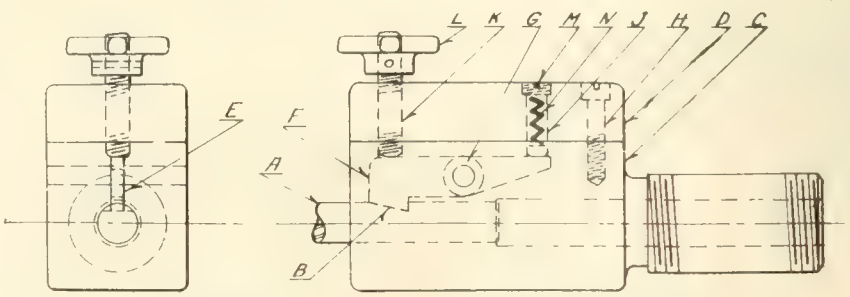
As a general thing, broach teeth are undercut slightly unless they are machining very soft material, while the average pitch of broach teeth would be equal to the square root of the length of the hole multiplied by the constant 0.35, thus: $P = \sqrt{L} \times 0.35$, in which P equals the pitch and L equals the length of hole broached. There should be a large fillet at R, while D must be deep enough to give chip space for the longest hole broached, this, of course, depending on the amount of metal removed by each tooth and no general rule can be given governing this, as it



PIN HELD IN WITH SPRING FOR HOLDING BROACH



GRIPPING LEVER.



A LATCH METHOD FOR HOLDING BROACH.

FIG. 8 - PIN AND LATCH ARRANGEMENTS FOR HOLDING BROACHES.

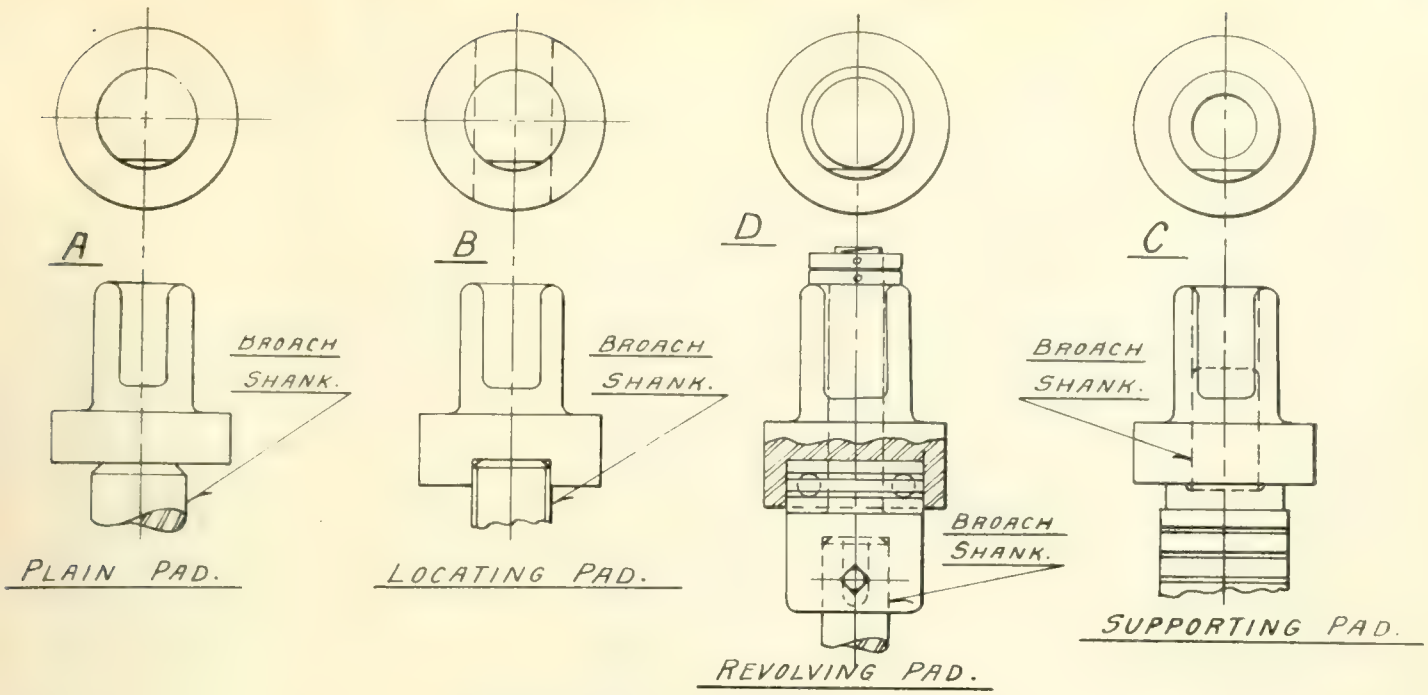


FIG. 9—FOUR TYPES OF PUSH BROACHING PADS.

will depend on the toughness of the metal, as, for instance, cast iron, bronze, soft or hard steel etc., would vary this amount and there are other conditions which will be taken up later.

The rule given above for determining the pitch of the teeth must not be unqualifiedly taken, however, for, if the teeth are too close together too much power will be required to pull the broach through the work, also the pitch should never be coarse enough to allow the teeth to straddle the work, or in other words the pitch should never be greater than the thickness of the work and two teeth should be in contact with the work at all times.

Various Broach Designs

In Fig. 13 a number of diagrams of broach design are shown, of which the first is a broach for a square hole. Considering the upper row of diagrams only, the first shows a section through the shank of a broach which enters the hole, the second shows a section part way up the broach, the third shows a section near the finishing end of the broach, while the last illustrates how the finishing teeth would look. It will be noticed in all of these views that the diameter A remains the same, while the dimension B is increased successively to square out the corners of the hole. The row of illustrations below show successive stages in the construction of a hexagonal broach, while below a typical broach drawing is shown where Y is the broach shank or holding portion, X is the starting portion equal to the length of the work bushing and the remaining portions describe how the teeth are to be proportioned at various parts of the broach. The design of a broach is largely a matter of experience, and Fig. 13 simply gives an idea of what this experience leads to. A broach designer will try to have all his working teeth do an equal amount of work, therefore as a broach starts to cut out a square from a round hole the teeth will be working on a greater radius at the start than

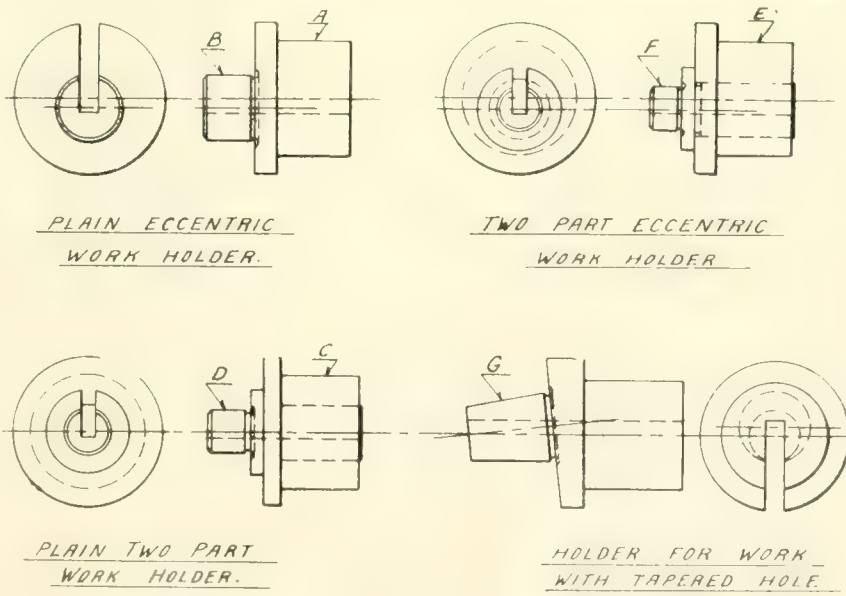


FIG. 10—A GROUP OF SIMPLE WORK HOLDERS.

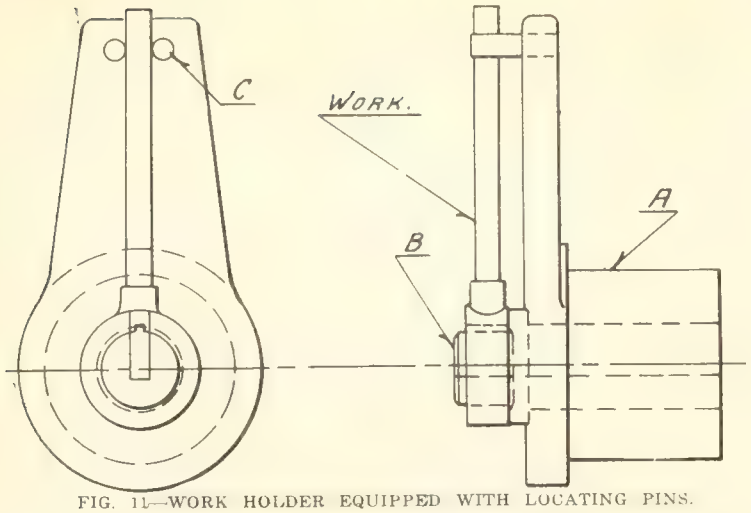


FIG. 11—WORK HOLDER EQUIPPED WITH LOCATING PINS.

when part way up the broach, as indicated at C and D in the upper illustrations. To counteract this the teeth which first start to cut on the broach are made to take lighter cuts as regards depth than those further along, as will be noticed from the notes, .002 rise, .003 rise, etc., on the lower illustration, while a number of teeth at the end of the broach are made equal rise in order to maintain the size. Various shaped broaches require different treatment in this regard, and no general rule can be given which would cover this phase of broach design.

Among the features often met in pull broaching are two or more parts being broached together by placing them one against the other, or a number of parts will often be broached simultaneously by grouping them on a suitable work plate and using a group of broaches. On some classes of work broaching is supplanting reaming, as it is claimed that the broach will hold its size for a much longer period than a reamer, will make straighter holes and smoother holes at increased production.

Broaches are also used to some extent for correcting inequalities caused by the hardening of some parts; the practice in such cases being to pull a broach slightly larger than the hole required through the work after hardening. The broach in this case has no teeth, the operation being one of compressing the metal and a lubricant is, of course, used at this time to prevent tearing the metal.

Another type of broach used for enlarging holes in soft material instead of reaming is made up with a series of spaces and steps, which are rounded slightly on top and highly polished; these are forced or drawn through the work and compress the soft metal, thus forming a glassed surface, which is oftener superior to reaming on soft white metal, babbitt, bronze, etc.

Having dealt at some length with general details of broach construction and operation in the next section of this article, reference will be made to types of broaching machine and examples of broaching practice.

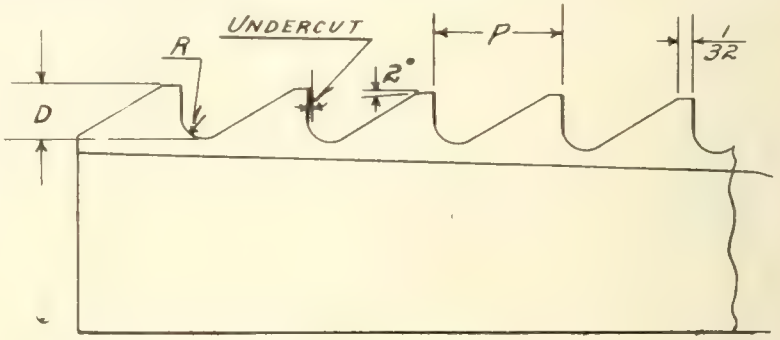
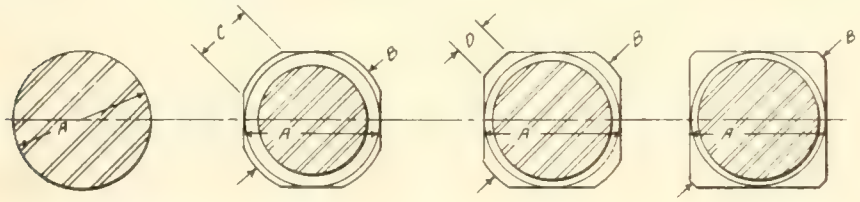
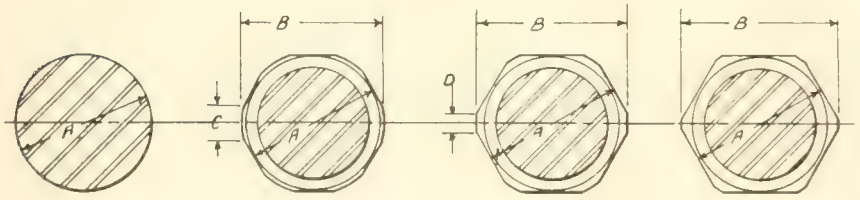


FIG. 12—DIAGRAM SHOWING CONSTRUCTION OF BROACH TEETH.



SUCCESSIVE STEPS IN MAKING UP A SQUARE BROACH



SUCCESSIVE STEPS IN MAKING UP A HEXAGON BROACH

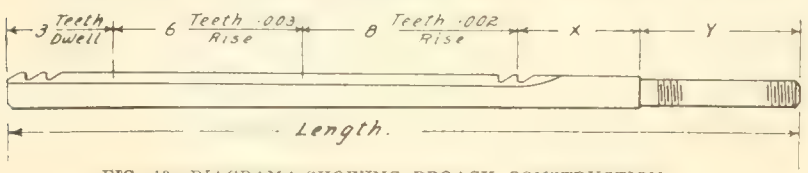


FIG. 13—DIAGRAMS SHOWING BROACH CONSTRUCTION.

Vancouver.—The shipping interests of Vancouver are petitioning the Dominion Government to construct a floating drydock here. While it is felt that a permanent drydock would be more desirable, the cost of construction and the time required would be much higher than for a floating dock. The latter could be built and finished in about a year, while a permanent dock would require about three years at the least.

A new high-speed steel known as chrobaltic alloy, which can be cast into intricate shapes, is mentioned in the "Iron Age" as being used as a substitute for tungsten and vanadium steel by a Chicago company in the manufacture of milling cutters and other tools having multiple cutting edges. The castings have the appearance of smooth forgings and are said to be practically non-rusting and acid-resisting, and the heat-resisting qualities of the alloy are such that it does not scale in the fire, thus adapting it to milling cutters having thin edges. The steel may be hardened in oil or air, and it is explained that the processes of annealing and rehardening may be repeated without the steel losing any of it properties. Annealing is effected at 1832 deg. Fahr. in a closed muffle. Cooling is allowed to proceed slowly.

Various Conveyors Used in Canning Industry

By J. H. MOORE

CONVEYORS to right of them, conveyors to left of them, volleyed and thundered, could well apply to the plant of the American Can Co. of Hamilton, Canada, who, as readers well know, manufacture almost any size and shape of tin can, and a considerable variety of paper can as well.

In work of such nature it is absolutely imperative that the work proceed at a regular gait from operation to operation, until the completed can, so that conveyor form a large part of this plant's equipment.

To show by photograph all these conveyors would take a volume. There are all sizes and types to be seen on every side, some in the form of endless belts, while others take the shape of chain conveyors. Then there is the ordinary chute style, down which the cans comes from either some other machine on the same floor, or on the one above. These conveyors even go out direct to the cars which are loaded at a surprising rate of speed.

THE CHAIN TYPE OF CONVEYOR USED FOR PULLING CANS THROUGH SOLDERING TANK.

FIG. 1. WIRE LEAF CONVEYOR USED IN CONJUNCTION WITH PRINTING PRESS.

In addition to these various style cans, this firm manufacture shoe polish boxes, which are first of all lithographed in their flat state before being stamped and drawn, or punched into shape. These lithographed sheets go direct from the press to a drying oven by means of a novel conveyor, which is illustrated at Fig. 1.

This conveyor is made up of rod iron compartments or shelves, which keep each sheet of lithographed tin away from the other. The complete arrangement moves slowly through the drying oven, and on reaching the other end is dry and ready for handling. The girl placing one of these sheets in position shown in the photograph needs no comment since the action is self-apparent.

At Fig. 2 we illustrate the chain type of conveyor. This chain has a series of lugs on it which come in contact with the cans, pulling them through (at correct speed) the soldering tank. On reaching the other end of the machine they are soldered down the vertical seam and pass on to the next operation.

Last, but not least, we illustrate the common or garden variety of chute. Readers will note the close proximity of the two chutes A and B. This is one

(Continued on page 529)

FIG. 3. THE SIMPLE CHUTE CONVEYOR FEEDING VARIOUS OTHER OPERATIONS.

The Terrific Punch of a Small Boiler

Explosion in Small Shop Where Vulcanizing Was Done Opens Up a Question of Interest—Terrific Power Released Does Great Damage

By T. H. FENNER

IF there are still sceptics on the subject of the dangers of small vessels containing water and steam under pressure and temperature conditions it is surely not through lack of object lessons.

The latest of these demonstrations occurred in Toronto very recently, much to the detriment of the building in which it occurred. Fortunately, or we might say, almost miraculously, it was not accompanied by any loss of life or limb. The case referred to was the explosion of a small cast-iron vessel used for vulcanizing automobile tires, and it was situated on the second floor of a garage and service station on Jarvis Street, Toronto.

The apparatus consists of a cast-iron vessel of square cross-section in the lower part, the upper part being made a semi-circular shape, to conform to the shape of the tire. There are three sections, so that three tires can be handled at once, and the vulcanizing is performed by the heat of steam circulating round the inner surface of the moulds. This steam is generated from the water contained in the lower portion of the apparatus, and the necessary heat is applied by a gas flame on the bottom. The lower part, which is practically a cast-iron boiler, is filled with water through a funnel, and holds probably 50 lbs. of water. After filling, the funnel is removed and the hole plugged. A safety valve set to blow off at about 40 lbs. per square inch, and a steam gauge are fitted.

Where the Valve Stops Work

The pressure used will, of course, never exceed the pressure at which the valve is set, unless something prevents the valve from working. Evidently something of that nature happened in this case, for while the attendant, fortunately for himself, was temporarily absent, an explosion occurred. The result was the complete demolition of the vulcanizer itself, the shattering of every window on the second floor, and the splitting of the front wall of the building from top to bottom.

A very respectable effort for a couple of pails of water, was it not?

As a bystander remarked, one would wonder how such a little thing could do such enormous damage. However, a little study will dispel the wonder, and probably bring home to many more or less complacent users of boilers the nature of the forces they are handling.

We may fill a boiler, or other vessel, with water and then, by means of a pump, produce pressure high enough to rupture the tank. No explosion happens. Why? Because there is no latent energy contained in the water to cause one. The vessel ruptures, and the pressure disappears. The energy contained in the water has been used up in overcoming the resistance of the material to rupture. That is why testing of boilers is always done by means of hydraulic pressure. Water being practically incompressible, a stroke or two of the pump is sufficient to increase the pressure after the vessel is once filled.

But When Heat is Applied!

Now, let us take a vessel, and partially fill it with water, which we proceed to heat, until some of it evaporates, and steam is formed. Instead of the water possessing no latent energy it will possess an enormous amount. To raise one pound of water one degree requires one heat unit, and this heat unit represents the same amount of work as the raising of 778 lbs. one foot high. In other words, the heat unit, known as the British Thermal Unit equals 778 ft. lbs. Now, to change one pound of water at 40 degrees Fahrenheit into one pound of steam at 40 lbs. per square inch gauge pressure requires approximately 1,161 B.T.U's, equivalent to 903,258 ft. lbs., or energy sufficient to raise 1,000 pounds 903 feet high. Now, to come back to our little vulcanizer, which seemed so small as to be harmless. Assuming it held 50 pounds water, and 10% of this had become steam at 40 lbs. per square inch gauge pressure. We would have 5 lbs. steam containing 5,805 B.T.U's. We would have 45 pounds of water at 40 lbs. pressure, the temperature corresponding being 285°F.

Let's See Just What Happens

As the initial temperature of the water is taken at 40°, the quantity of heat in the water would be $45 \times (285-40) = 45 \times 245 = 11,025$ B.T.U. Now, we can neglect the energy lost in breaking the vessel, as we have no means of estimating it, and we will assume that all the energy of the steam and water is available to do its worst to whatever obstructs it. Steam occupies, roughly, 1,600 times the volume of the water from which it is formed at atmospheric pressure. The first thing that happens when the vessel breaks is the reduction of pressure. Now, the water, which is at a temperature of 285° at 40 lbs. pressure, is considerably above the temperature of steam at atmospheric pressure. Therefore, a considerable amount of water will become steam, and will want to increase its volume 1,600 times when it does so. Let us see how much. We have available altogether $5,805 + 11,025 = 16,830$ B.T.U's. Each pound of water in becoming steam at atmospheric pressure will absorb 966 B.T.U's. Therefore, 16,830 divided by 966 will give us the amount of water that becomes steam at atmospheric pressure, roughly, 17½ lbs. One pound of steam at atmospheric pressure contains 1,146 B.T.U's, and 17½ lbs. contains 20,055. All this heat energy is available to remove anything that wishes to prevent the expansion.

See What We Have Now

Translated into foot pounds, the energy is 15,602,790. That is, enough to raise 7,800 tons one foot high, or 1 ton 7,800 feet high. The volume of 17½ lbs. steam at atmospheric pressure is 460.25 cubic feet. That means that in order to occupy that volume that much air had to be displaced, and anything that tried to confine it had to go. Luckily there were plenty of windows, which yielded easily, but not enough, as witness the broken wall. It is no wonder that the place looks as though it had been struck by a shell.

Do not despise the boiler because it is only a small one!

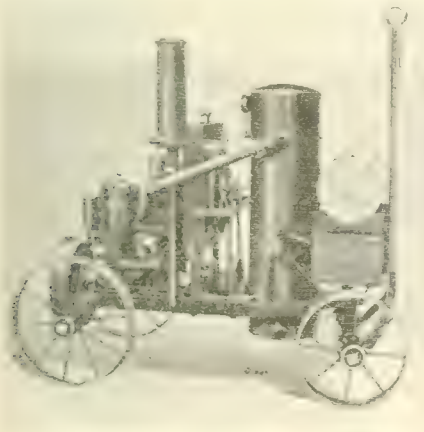
TEN times as much alcohol to be used under prohibition than formerly. This is the prognostication of a member of the American Chemical Society, at a symposium held on the question of alcohol. However, this quantity will not be made up into seductive cocktails, or sympathetic gin rickies. It will be used to propel vehicles, boats, and other power-users when the petroleum supplies become less. There are a number of new sources for the supply of alcohol, one of them being the nippa palm. This palm yields about 15% sugar, which can be fermented. This source alone would give 50,000,000 gallons of alcohol a year.

Some New Styles of Compressing Machinery

By A. W. SWAN

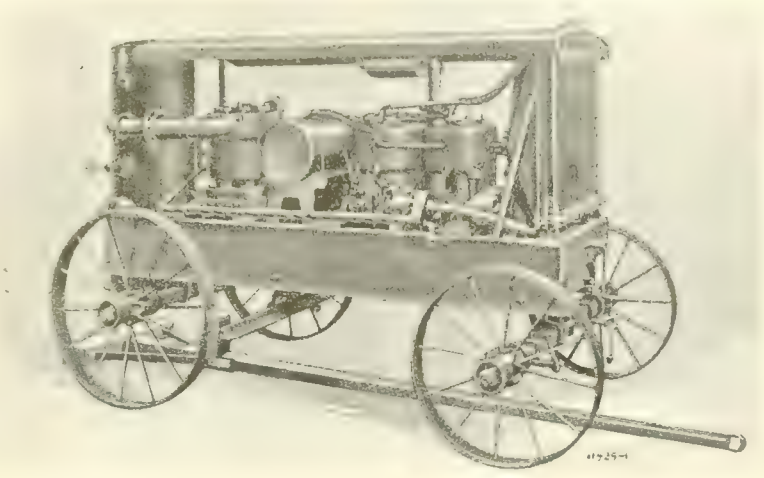
THE Ingersoll-Rand Company has recently added to its large line of air compressing machinery a light-weight portable gasoline engine-driven unit built in three sizes, known as the "Imperial Fourteen" portable compressor, the "Imperial Junior" compressor and the "Imperial Baby" compressor. These are of all steel construction, the larger sizes being provided with steel canopies or housings for protection against the weather. The power plant of the largest machine, consists of a high speed gasoline engine driving a vertical duplex compressor, while in the "Baby" a single cylinder vertical compressor driven by a single cylinder two-cycle engine is used.

The largest machine has a capacity of 210 cubic feet at 100 pounds pressure to the square inch and weighs 6,000 pounds, while the "Junior" has a capacity of 118 cubic feet at the same pressure and weighs 4,000 pounds. The "Baby" weighs 1,500 pounds and displaces 45 cubic feet at 90 pounds to the square inch. The gasoline motor provides an economical source of power and tends to simplify the mechanism to such an extent, that it may be safely entrusted to a laborer of average ability, who has a slight knowledge of gasoline engines. Such men are at present readily available and make excellent operators for an outfit of this type.



BABY IMPERIAL PORTABLE AIR COMPRESSOR.

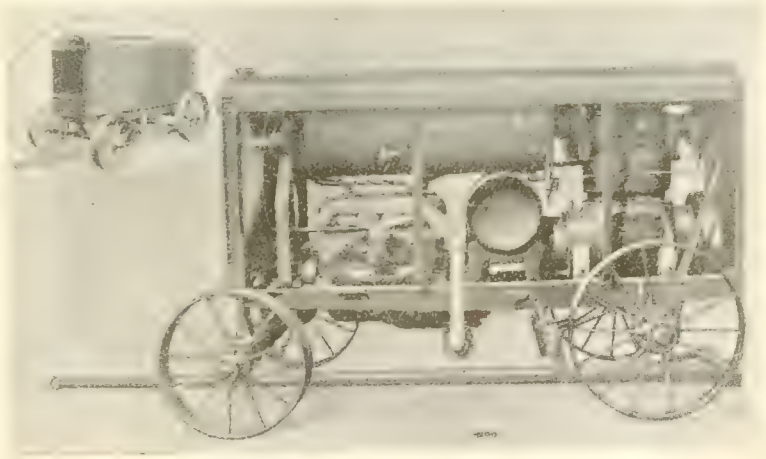
The larger compressors have both cylinders cast en bloc, with heads, valve chambers, and water jackets integral, while the smallest size is fitted with a removable cylinder head. Plate inlet and discharge valves are used on all three sizes, located directly over the cylinder bore, with the exception of the "Baby," in which the inlet valve is located in the top of the piston. The crankshafts and connecting rods are drop forgings. The compressor pistons are fitted with three-piece rings and in addition with an oil wiper ring, which returns surplus oil to the sump in the crank case and obviates any difficulty which might be caused by the air carrying an excessive amount of oil into the receiver. All bearings are die castings of antifriction metal and are adjustable for wear. Access to the main bearings and those of the crank pins is provided for by means of conveniently located handholes in the crank case. All working parts are lubricated by splash from the oil reservoir in the lower part of the crank case, with the exception of the smallest size, in which the main bearings are lubricated by compression grease cups, and the compressor cylinder by a sight feed lubricator placed on the intake. The starting crank is located at the front of the machines under the radiator.



IMPERIAL JUNIOR COMPRESSOR.

Both the compressor and driving motor are water cooled by a circulating system with a centrifugal pump, large radiator and powerful blast fan. A point worthy of particular notice is the fact that, except in the case of the smallest machine, the radiators are made up of a number of removable sections, a type of construction which allows a damaged section to be removed and repaired without taking off the entire radiator, or putting the outfit out of commission while repairs are being made. Each unit is equipped with an automatic intake unloader which maintains a constant pressure in the receiver and permits the motor to be started easily. The receivers are tested to a Hydrostatic pressure of 300 pounds to the square inch, and are fitted with safety valve, pressure gauge, drain cock, and two service valves, to which the air supply hose line may be attached, with the exception of the "Baby," on which only one service valve is mounted.

An interesting feature in the construction of the smallest machine is the use of a two-cycle motor in place of the single-cylinder four-cycle motor usually



IMPERIAL FOURTEEN PORTABLE COMPRESSOR.

found on machines of this class. Through the employment of the two-cycle type, the machine is more thoroughly balanced in regard to both reciprocating parts and power impulses than would be possible were a four-cycle single cylinder motor used, and the increased weight and cost of a multi-cylinder engine are eliminated.

The absence of valves in the combustion chamber and their accompanying cams, push rods, and tappets, simplifies the motor to a large extent and contributes in a large measure to the reliability of the equipment in the hands of men with little or no experience with gasoline engines. A double throw crankshaft, common to both the compressor and the motor, suspended in three bearings—formed by bolting the crank cases together by means of a distance piece—does away with all external couplings and provides an efficient and compact unit.

The largest compressor is driven through the medium of a fibre-faced cone clutch (controlled by a crank outside the truck frame) which delivers power from the motor to a transmission shaft carrying a case-hardened chrome vanadium pinion engaging with a hardened steel gear pressed on the compressor shaft, while in the "Junior" the fly-wheels of both the compressor and motor are placed in line and connected by a number of steel pins passing through holes bored in each fly-wheel, making a strong and positive coupling, which can be readily taken apart.

The method of mounting the machines is worth attention, particularly the swivelled front axle, which moves freely in both a horizontal and a vertical plane. This arrangement, together with the rigidly attached rear axle, gives a three-point suspension and permits the outfit to be hauled over very rough ground without any racking effect on the alignment of the power plant. When the fuel tank has been filled, lubricating oil provided, and the radiator supplied with water, the outfits are all ready for use. In the larger sizes they are adaptable to a wide range of service in engineering and construction work, such as operating a number of rock drills, portable air hoists, pneumatic drills, chipping, riveting and caulking hammers, drift bolt drivers, pile hammers, tie-tampers, wood borers, etc., while the smallest outfit may be used to operate one or two air tools, or for cleaning electric motors and machinery, sand blasting, spraying paint, whitewish or other liquids, and many other odd jobs around the power station and industrial plant.

IT DEPENDS

Mrs. Flatbush: "What does your husband call your dog?"

Mrs. Bensonhurst: "When he's calling him into the house, do you mean, or chasing him out?"

ARC WELDING MAKES GOOD

By Robert E. Kinkead

Considerable savings may be effected by welding defective castings, according to Robert E. Kinkead, in a paper presented at the annual meeting of the American Foundryman's Association in Philadelphia, Sept. 29 to Oct. 3. In describing methods of welding castings, the author calls attention to the fact that electric arc welding has been used in steel foundries for about ten years, and during that period the sentiment toward salvaging defective castings has changed in a most remarkable manner. The repairing of defective castings by arc welding is said now to be standard foundry practice. The paper continues, in part, as follows:

The field in which the metal electrode process is best applied is in dealing with small steel castings where the defect is of minor importance and in larger castings where the defect occurs in a section which is thin, and on which the heat must be extremely localized.

Good foundry practice indicates that steel castings which have been welded by the carbon electrode process should subsequently be annealed to relieve any local internal strains which may be introduced by the application of the heat of the arc. There are occasions, however, when it is extremely inconvenient and expensive to reanneal a casting which shows a slight defect. On such occasions the application of the metal electrode process, owing to the very great localization of the heat, will permit the correction of the defect without the necessity of reannealing.

Until recently 5-32-inch diameter metal electrode was as large as was ordinarily used in this work. Investigations have recently shown that ¼-inch electrode, and even ⅜-inch diameter rod, may be used in the metal electrode process to good advantage on steel castings.

The welding of malleable iron castings is difficult. The most important application of the metal electrode welding process in malleable castings is in the plugging of sand holes in castings which are to hold oil. A large number of the castings encountered in automobile work are of this nature. The welding on malleable iron is always done after the casting has been annealed. If the casting is to be machined at the point at which the weld is made it should be reannealed.

There are two classes of work which can be done in the gray iron foundry with the metal electrode process. In the first class are large castings which come from the sand with shrinkage cracks or low spots in parts of the casting which are not to be machined. In the case of a crack, it may be opened up by a chipping tool, and steel filled in to give a measure of strength and complete pressure tightness.

The welding can be handled with a low current, and should not be done continuously. The operator should weld for possibly 20 per cent. of the time; the remainder of the time being divided up into intervals to permit the heat to be distributed throughout the locality of the weld. This practice will not harden the cast iron in the vicinity of the weld with the exception of the iron which is within 1-16-inch of the line of fusion. The steel added will not be hardened by the absorption of carbon from the cast iron for a distance greater than 1-16-inch from the line of fusion. If the welder works intermittently he will avoid having the steel shrink away from the gray iron. The difficulty in machining such a weld arises from the hard area 1-16-inch on either side of the weld.

The second class of work which can be done with the electric arc on gray iron is in the correction of small sand holes and sand spots on surfaces which are to be machined. In work of this nature the sand hole is opened up and a nickel electrode fused into the hole by the heat of the arc. The nickel is not welded to the cast iron, but at the high temperature produced by the arc makes an intimate contact with the gray iron, which resembles an amalgamation. The nickel is then peened and the excess metal filed away. The job may be made pressure tight, and the application is entirely successful in the correction of sand spots in the bore of engine or pump cylinders. This process is not used for the repair of breaks in a casting, but is merely a method of plugging a crack or sand hole.

According to the "Weser Zeitung," Dr. Armo Relizi of Danzig and Dr. Walter Geister intend to start on an Arctic expedition by airplanes. The purpose of the expedition is to make topographical, oceanographical and meteorological surveys, and to test the value of aircraft in the Far North. The expedition will start from a vessel going as far north as possible, which will serve as the base for the operations which will be conducted north of the 58th degree of latitude. The machines will be biplanes of two types: light scouts of great speed, and heavy machines for the expedition proper. They will be fitted with floats with flat bottoms to enable them to land on water and on ice.

There is an electric light and power company located 200 feet from the Patapsco River, near Baltimore, Md. A cableway carries coal from the river to the power house and coal is also stored in the space between the power house and the river bank. Recently the power company started the erection of a new hoisting tower and bridge to handle coal, but the weight of the stored coal had started a movement of the ground toward the river and it was realized that the construction of the tower foundation in this shifting ground would be carried on with difficulty. It was decided to sink caissons at an angle so as to allow for the movement of the ground and this was done by suspending the caissons from a timber framework by means of cables. By letting out certain cables faster than others the desired tilt was obtained. After the caissons had

been carried down through the shifting soil (a distance of about 50 feet), they were brought to plumb and the excavation proceeded under air through a twenty-foot layer of sand to hard bottom.

TWIST DRILL BREAKAGES

A writer in an Old Country publication has the following to say on the breakage of twist drills: "With the increasing use of twist and fluted drills in the small repair shop and the ironmongers' workshop, come a greater number of complaints concerning the frequency of drill breakages. One such shop I know had, as a matter of fact, all but decided upon a discontinuance of their use, and averred that what was gained in point of drilling speed, was more than lost by the extra cost of twist drills over the flat-lipped kind, which could be made to any size and by any ordinary mechanic. I looked into the matter at the wish of the firm in question, and found that high as was the breakage list, the cause could be traced almost wholly to the conditions of the machines, and to the—yes, I must say it—to the ignorance of the men who operated them. In the first place the drilling machines were, I found, in an execrable condition, the spindles had a deal of lateral play in the centre bushings, and endwise the wear was such that the spindle could be lifted vertically a distance of more than ⅛-inch. Most of the drill disasters occurred at the point where the drill is just breaking through the metal; this being attributable to the sudden lessening of the spindle and the drill being forced to clear out too great a portion of metal. Then spindle looseness also permitted the drill to wobble unduly in the hole, and reduced stiffness, thus putting abnormal strain upon it. Further, I found that drill grinding was such a slovenly, unscientific operation that a deal more pressure than was necessary had to be exerted in order to make it cut. Incorrect and unsuitable rotative speeds were also a factor entering largely into the question of excessive drill breakages."

The Mournful Wail of an Old-Time Planer

By ITSELF

I AM a planer. True, I should not be ashamed of that fact, but I am an old planer, which explains the reason for my confession of shame. My more up-to-date brothers lord it over me every day of my life. Merrily their tables go back and forth eight hours each day, while I stand in a poorly-lighted corner, sometimes for a week at a stretch, receiving no material to work on whatsoever. It is on such days as these that I feel especially blue.

About an hour ago I felt that at last a real job was coming my way. The plant engineer was discussing with the superintendent the advisability of placing a certain piece of work on my bed. "Take no chances on that old contraption," said the plant engineer, "but put it on No. 39." This No. 39 spoken of is a big planer two machines up from me, in fact one of my worst enemies, for he is working day and night, purring to me all the time in an oily tone, "Oooooooh—go do some work."

I tried to attract their attention by rattling my pulleys, which are somewhat slack, but they paid no heed and continued their conversation.

The plant engineer was again talking. I listened closely. "You know, John (that was the super's name) I'd toss that old bird out on the scrap heap if I were you." Scrap heap! I fairly shook with rage, and rattled my pulleys in such alarming fashion that they both looked around as if actually afraid I was about to fall on them.

"I'll admit she's a little old," remarked the super, in answer to the former suggestion, "but I hardly think she's ready for the scrap heap yet."

Would that a planer had the power of speech! I felt like blessing that super., who still remained my friend—but what was this?—he seemed to be still talking.

"As I said before, she's not yet ready for the scrap heap, but mighty near it, I'll admit. Bill Smith tried a job on it a week ago, and would you credit it, he claims that the noise from the thing nearly deafened him."

The traitor! Once more I shook with rage. This time I must have rattled worse than usual, for they both looked at me, and then looked at each other.

"Guess you're right," said the super, finally, "she's about done for. I've rebabbitted those bearings about 140 times it seems to me, but she is all shot; out she goes after the shop shuts down on Saturday."

They moved off with this final decision, which was practically the same as the judge's final decision regarding any murderer.

I am no murderer, although I have heard some smart chaps around the shop say I murder any job I ever get—still I'm asking for a reprieve. I'm rattling worse than ever these days in order to attract attention to the fact that I firmly believe I'm not receiving a square deal, but all they do is laugh at me and say: "Thank goodness, she's going at the end of the week."

It is now Friday night, and the time grows near when I'll be merely a portion of the scrap heap. Who can tell but what my bed will be lying amongst some dirty, broken-up junk, while my framework is being broken up by some fool with a sledge, with nothing else to do but pound at me.

Would that I could tell machinists in general to be kind to the old-timers who worked for you so faithfully before these new fandangled machines came into being! Why not show us old-timers at least some consideration, even if it is only an odd job now and again? Still I suppose we must make room for the new blood. The space we occupy on the floor is even grudged us, so its off to the scrap heap for us.

I was moved to-day to the scrap heap, and it's just as I suspected. They took my bed away from me. They even took away my innards and placed them elsewhere, leaving only my framework. I felt positively naked. Then along came the chap with the hammer; not a mere sledge as I expected, but a huge magnetic affair, which was taken to a great height, then released.

Oh, could I but describe my feelings when I saw that weight coming rushing towards me! This was worse than I had ever dreamt of in my wildest moments.

Crash—It had reached me, and oh, I feel so weak now that I'm afraid I will not be able to speak much longer!

They have lifted the weight once more. Down it comes —— ——. I'm ruined now. I'm in at least a dozen pieces. Goodbye friends, I'm a gonner; no longer a planer, but just a part, yes, just a part of the scrap heap.

According to the United States Geological Survey, shaft 3 of the Tamarack Mine, Houghton County, Michigan, is the deepest mine in the world, with a depth of 5,200 feet. Other shafts of the Tamarack and of the Calumet and Hecla Mine in the Lake Superior region reach depths of between 4,000 and 5,000 feet. Three shafts of the Prizbram silver mines, Austria, have penetrated to depths of 3,300 feet. The Victoria quartz mine, at Bendigo, Australia, is 4,300 feet deep, and a number of shafts in the Transvaal gold region have been sunk to depths of nearly 4,000 feet.

VARIOUS CONVEYORS USED

Continued from page 525

feature which makes such chutes so handy as the space they occupy is not only small but they can be placed almost in any position.

This article is not an attempt to cover the conveyor problem, but rather just an illustrated talk on some interesting methods employed.

WHAT OUR READERS THINK AND DO

AN INTERESTING RADIUS PLANING TOOL

By J. H. Moore

The writer on a recent editorial visit came across a very efficient planer or shaper tool, which he believed would interest our readers, so he photographed the tool by itself, with the result shown in the picture accompanying this article.

The tool, while crude in some details, accomplishes the work very nicely, and after all, it is the idea that we offer to the reader.

A general glance shows the tool's construction, the portion A, being the stationary member of the tool. B revolves inside A, by means of the following motion:

The handle C, operates a worm, (not shown) which is at the back portion of the tool. This worm in turn operates a gear fastened to B. This, of course, turns B around in a complete circle if necessary.

The majority of work done with this tool is the planing out of various dies of different radii, and the completed work is very accurate and satisfactory. Of course, the handle C, is turned by the operator at whatever speed he desires.

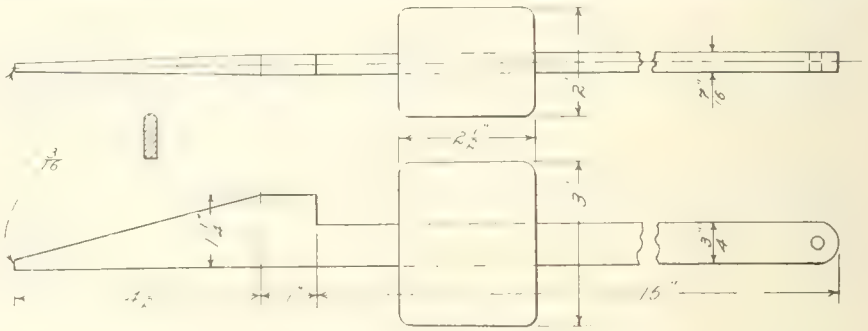
Depending on the radius required, the tool D, is set out—or in from the centre, and the distance from the centre to cutting edge of the tool being the vital point. This feature allows such a tool a wide range, and a attachment of such a nature as described is a mighty handy thing to have around.

NEW STYLE DRIFT KEY

By A. C. McALPINE

How many drill operators, when asked, can immediately lay their hands on the drift key belonging to their machine? The first time you are through the shop just try and see. When there are two shifts the day man generally locks this kind of tool in his cupboard, with the result that the night man loses all kinds of time searching for substitute. There is also the danger of men using files for this purpose, and a good many eye acicdents have been caused by this practice.

The writer of this article stopped at one of the "drills" in the shop to get the thickness and taper of drifts in use and on asking the operator for his drift was quite three minutes in getting it, owing to it being under a pile of drills and other tools. The following device will eliminate this waste of time and is in use at the Canadian Pacific Railway Angus shops. A steel drift is made according to sketch attached. This drift is made tapered on the flat as well as the edge, so that it can be used for all sizes of drills. To this key is welded a piece of mild steel, 15 in. x ¾ in. x 7-16 in., on which a cast iron weight is made to slide. The drift is applied in the usual manner and the weight thrown up to it, giving a blow similar to a hammer blow. Thus you have a drift key and hammer in one tool. A good long chain is attached to this device and fastened to some convenient part of the machine.



DETAIL OF THE DRIFT KEY.

THE EYE AND THE OXY-ACETYLENE FLAME

In commenting on a Government publication on eye protection, Professor Koppins, of Chicago University, says: "There is no doubt that in using the oxy-acetylene flame, and looking at it with the eyes unshielded, the condition is not normal, and some sort of disturbing effects result. Outside the volume or intensity of light, which is a personal matter, since some people feel perfectly comfortable in light of a certain intensity which would make other people feel

GENERAL VIEW OF THE TOOL

uncomfortable, there is the question of short light waves coming. Normal eyes are so constructed that they can only perceive the light which is contained between rather narrow limits, that is from the longest red to the shortest violet. The longer waves are heated waves, and do not affect the eye in any other way except in intensity, but the shorter waves are the dangerous ones, since they are the chemically active rays, which will affect the eye on that account besides on account of their intensity. Just what the effect is depends upon the intensity and length of exposure. A relatively short exposure causes burns on the skin such as are caused by the sun, in fact sun burns are produced by the short rays in the sun light. Prolonged exposure would, of course, cause more severe burns, and since, of course, the operator usually takes precautions when he is warned, the extreme effects are not known. It is safe to say, however, that the result is similar to that caused by X-ray burns, which, of course, are much more severe, and have cost the lives of careless operators.

Regarding eye strain, that depends upon whether or not the person who wears correct goggles should have any bad effects due to the ultra-violet light. Of course the goggles should be so constructed that any extraneous light cannot enter at the sides, since the sudden change in intensity would undoubtedly strain the eyes.

TORONTO SECTION A.S.M.E. MAKE PLANS FOR THE COMING WINTER

Increased activities in the various branches of the engineering profession and the need for more recognition, to some extent influenced the programme outlined for the ensuing season at a dinner held in the Engineers' Club by the Toronto Section of the American Society of Mechanical Engineers, on November 14. Shop visits will be made to various plants in Toronto and vicinity, informal dinners will be held, and papers of a character calculated to ensure an increased attendance will be read.

A strong effort will be made to increase the membership in this particular section, and it is expected that, with the large body of mechanical engineers resident in Ontario, the Toronto Section will become one of considerable influence.

Brigadier-General C. H. Mitchell addressed the meeting and gave some very interesting reminiscences regarding the mechanical phase of the war both in France and Italy. The Italian power stations, all hydro-electric, had greatly expanded since last seen by the speaker, some years previous.

REMOVING BROKEN TAPS

A tap, broken off in a hole, is often very troublesome to remove, and sometimes it costs less to throw away the part than to remove the broken piece with ordinary means. But the oxy-acetylene torch makes the job easy. The flame, directed against the end of the tap, will heat it so quickly that, generally, the sudden expansion will push back the walls of the tapped hole sufficiently to loosen it when slowly cooled off. If heating alone in this manner does not prove effective it will at least have so softened the hard steel that it can be drilled out. This is one only of the many profitable uses that can be made of oxy-acetylene apparatus in metal-working shops, no matter what the line may be.

IS THIS THE LIMIT?

Motor car thieving appears to be reaching the status of an industry when we discover that the more enterprising of these gentry actually possess lorries fitted with hoisting gear, so that a car can be lifted bodily on to the lorry, covered with a waterproof sheet, and then taken out of the district without leaving a trace. Probably they have been conduced to by carelessness, but when a thief prowls around in a crane-equipped lorry and with an oxy-acetylene blowpipe apparatus, it really does not matter much what care is taken to prevent theft. The car that can be driven away probably will be, but if not, the simulation of a breakdown job is sufficiently reasonable to lull even the peripatetic policeman into an academic interest in the purloining.

A Plea For Model Making

Sir:—Having only been a subscriber to CANADIAN MACHINERY for a short time, I do not know if the subject of model making has ever been discussed in your pages before. If it has not, I for one, think that now would be a good time to make a start, and if you are willing to put this in print, will do so.

My idea is, that a boy apprentice or young man just starting a trade, will take more interest in his work if he is encouraged to make models of machines or engines either whole or in part. It is extremely educational, in that, the man (young or old) who desires to make a machine in miniature has got to know the principles of movement or action of the one he is copying. Because if he be ignorant of such he will have to study the larger one at work, and if at all possible take it apart to study it.

All this calls for a knowledge of machine design and drawing and is in itself of great educational value. The knowledge gained by thousands of model-engineers in Great Britain previous to 1914, was used to a great extent during the war, especially as hundreds who were experimenting with metallic alloys for aeroplane and other models where speed and lightness with great strength was required, gave their knowledge to the use of the country.

The factory where I served my apprenticeship in the '90's in England made complete rolling stock for a railway and all the boys were encouraged to make all their own tools and also models of machines and locomotives, coaches, cars, etc., according to whatever department they were in. A chum of mine who was in the passenger coach department made during his last years a complete passenger train and during the same two years I was busy making a 1/24 scale model of what at that time was the famous 307 passenger engine, winner of the first prize for speed and beauty at the Paris Exposition. I think that my model is still in the Machinery Department of the South Kensington Museum, London, England.

One reason that I am writing this is that I would like to see a society or association of model engineers started in Canada, similar to the one in Great Britain. During a 25 years' ramble 'round the world, working at the mechanical and steam engineering, I have only had the luck to meet 4 brother model makers, knowing them to be such when meeting them.

What really caused me to write this, was that I had just started to make a 1/12 scale model of a locomotive jib crane, two-drum electric drive with geared traverse and swing. Some friends who are not mechanics sneered at the simplicity of making such a toy, but to me it certainly is not a toy and I have found that working from memory as I am, it has some very puzzling peculiarities to overcome.

With a very small outlay for tools a man can make some very instructing models. One of the simplest to start on is a box or lattice girder bridge. Whoever starts one, if it is a long span, has got to remember or know quite a bit of side strains and vertical stresses to prevent buckling and so spoiling the finished article.

Trusting that you will print at least a part of the foregoing (picking what you desire).

I beg to remain, yours respectfully,
WM. R. GREEN,
Box 75, Eyebrow, Sask.

DEVELOPMENTS IN SHOP EQUIPMENT

THE STUEBING LIFT TRUCK

By J. H. R.

Local and interdepartment transportation in large manufacturing plants and warehouses, is a problem that has been given a great deal of attention during the past few years, and factory executives are realizing more and more the importance of this essential phase of plant management, not only as a means to greater efficiency, but also as an economic necessity. The method generally adopted for the transfer of material from one location to another is by trucking, in one or other of its many forms.

The truck here illustrated is that made by the Stuebing Truck Company, of Cincinnati, Ohio. It has many features that commend it to the user. It might be classified as a roller-bearing, all-steel lifting truck. The frame proper is made of high grade machinery steel of bridge construction, with spacing braces or saddles made of electric steel castings. This design insures the maximum strength and stability with extreme lightness. The four wheel type of support eliminates the possibility of dislodging the load when turning a sharp corner or when passing over irregular flooring. Both the head that supports the front end of the truck frame and likewise the large forked king bolt that carries the steering wheels are made of high quality electric steel castings; carefully designed to withstand the severest stresses. All four wheels are equipped with Hyatt roller bearings, and are of broad face to prevent tipping and injury to the flooring. Special facilities are provided to protect the roller bearings from dust and dirt. Milled oil reservoirs are provided in each wheel hub, and automatic closing caps are fitted to the oil cups.

The bearing faces on the front head and swivel are accurately machined, which permits of easy and smooth manipulation under heavy loads. The front end construction is designed so that the steering wheels may be turned through a complete circle if desired. The truck may be turned in a space equal to a little more than the square of its length.

The lift hook, that is attached to the front saddle of the elevating frame, is operated from the lower end of the steering and lifting lever; both of these parts being made of special steel. The operation of the lift hook is semi-automatic in its action, and is controlled by the cast steel pedal that releases the hook from its raised and locked position.

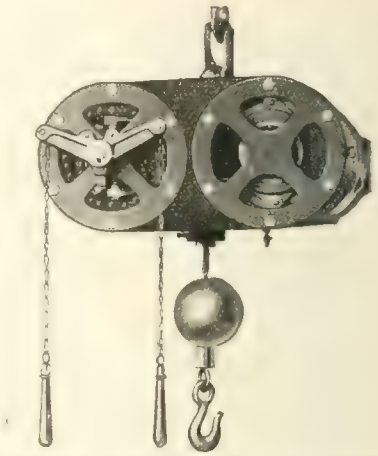
The positive safety hydraulic check is of the double-acting engine cylinder construction, the chamber being accurately machined to fit the piston, which is provided with a closely-fitted ring that permits of automatic adjustment to different degrees of pressure and temperature. The flow of the oil can be regulated to suit the varying loads and conditions under which the machine is to operate.

These Stuebing trucks are made in several sizes, and special ones may be obtained to specifications. All essential parts are standardized and interchangeable. These trucks are being manufactured and sold on the Canadian market by the Canadian Ekron Scale Company, 16 Notre Dame Street East, Montreal.

GENERAL VIEW OF THE TRUCK.

NEW HOIST ANNOUNCED

After a long period of experimental development, Victor R. Browning & Company, of Cleveland, Ohio, announces the perfection of a new hoist, designed specifically for the severest kind of industrial service. This hoist is specially interesting in that it combines very admirably handling of features considered primarily essential, together with new ideas that are obviously of considerable value. The general shape and low design of this hoist adapts it particularly for use where headroom is limited or the

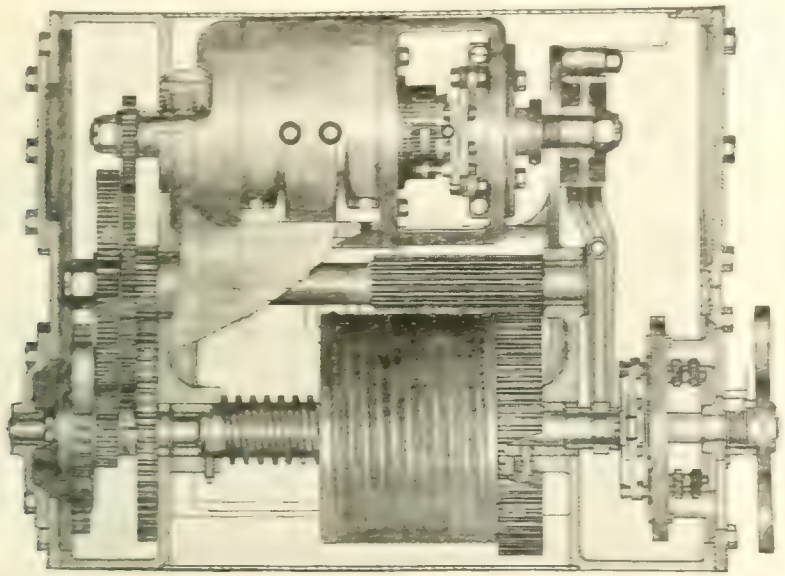


GENERAL APPEARANCE OF THE HOIST.

available space otherwise restricted.

The main casing which carries all moving parts, contains individual compartments for the four units, any one of which can be quickly removed if desired.

In and out of the casing run the reverse gears and the link belt brake are located.



SECTIONAL PLAN VIEW OF HOIST

assembled unit pictured in (4). At the reverse end the controller and motor brake are carried in another individual compartment. The entire controller may be quickly removed for inspection or repairs, and the removal of a cover gives access to the gears and load brake.

Between the gear and controller units are two long compartments, one of which contains the motor and the other the hoisting drum. The drum is carried on a threaded shaft and travels longitudinally while rotating. This feeds the cable through a bushing in the main housing and directly into the drum groove in rewinding. It is claimed that this adds considerably to the life of cables and maintains perfect balance. Simple but dependable limit attachments are installed at ends of the drum to prevent overtravel of the drum in either direction.

All bearings are bronze and bushed with phosphor bronze with exception of the motor, the shaft of which revolves on ball bearings. Two of the bearings are provided with grease cups while the other four are lubricated by splash from the gears.

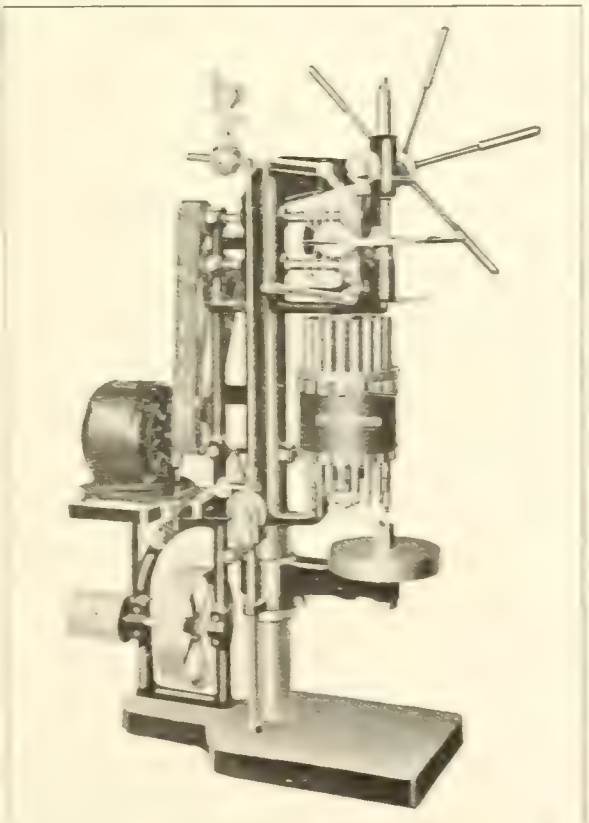
This hoist is furnished with specially designed motor either D.C. or A.C., and provision can be made for suspending it from an overhead trolley, I-beam, or any kind of fixture.

A circular describing this hoist in detail is available to anyone interested.

LIMA MULTIPLE-SPINDLE MAGAZINE DRILLING MACHINE

The multiple spindle drilling machine, shown in the illustration and manufactured by the Lima Drill Press Co., Lima, Ohio, is known as the magazine type, and has features not common to multiple drilling machines. The machine, which is fitted partly at the factory and to the shop floor, has for its base a casting of various size drills, reamers and countersinks, including the necessary of boring the magazine ring, for each different operation.

The magazine having 16 spindles acts as a drill rack for 16 different sizes of tools. Each of these can be easily moved into position for immediate action by simply turning the magazine to the point where the drill to be used is in alignment with the driving shaft. When a spindle is in the correct position



GENERAL VIEW OF THE DRILL

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Warned of the Shortage

SIX months ago this happened: Salesmen from steel mills went into a good many of the Canadian plants and told the parties concerned that now is a good time to buy. Prices are not going to be lower for a long time and the indications are that business is going to increase, with the result that your orders, if delayed, will have to stand in line and wait. Mills want business now, and they can give you the very best of service in regard to quick shipment.

Now imagine a salesman coming into your office today and saying: "We can ship at once anything you need in plates, sheets, tubes, hoop steel, bars, etc." He would be tossed out as unsound mentally.

Machine tool dealers not many months ago were telling you the same thing. They could get their orders through in a month. They could get you service then that all the money you can scrape up cannot buy now.

Now these are facts. Not only were the dealers trying to drive these matters home, but they were referred to many times in the market sections of this paper. For instance, the Pittsburgh correspondent of CANADIAN MACHINERY knows the steel situation in United States as few men know it. Readers of this paper have the benefit of his weekly review of the situation, and he gives his opinion freely of things as he sees them, and of events that are likely to work out of present conditions. A long time back he spoke of the time when steel would be scarce and premiums demanded.

It pays to read the market news. Buying is one of the greatest departments in the business. A good buyer is as essential as a good salesman, if not more so, for the reason that they are rarer. A good purchaser must know conditions. He cannot visit all the centres where raw material comes from, therefore, he must read them.

Conditions are not comfortable in a number of Canadian plants now, because customers persisted too long in staying out of the market. They were warned, but they did not heed the warning.

New York Papers Strike-tied

CANADIAN MACHINERY extends sympathy to the trade and technical papers of New York for the way in which they have been treated by certain of their mechanical departments. They had an agreement with their pressmen, but when it suited the pressmen to leave the premises, the agreement counted for nothing at all.

As a result such publications as *Iron Age*, *American Machinist*, *Machinery*, *Power*, *Electrical World*, etc., have had to more or less suspend. They have made an admirable attempt to keep their readers informed by various means regarding marketing and kindred conditions, but the outlay involved in keeping up staffs without any returns from advertising revenue must mean the loss of many thousands of dollars.

As far as the New York papers are concerned they did all they had agreed to do when they signed up. The strike to them was simply a case of gunning in a dark alley.

Canadian trade and technical papers sympathize with the New York publications, and hope that the right of their position will soon be so thoroughly demonstrated that publication under decent and secure conditions can once more be successfully undertaken.

Recommends Coal as Prime Mover

THE possibilities of developing power in Alberta are carefully analyzed by James White, of the Commission of Conservation in a paper now published, but read before the Industrial Congress at Calgary.

While, a little apart from the subject, it is interesting to note that the factories of the world, including electric lighting and street railways, use 75,000,000 horse power; the railways of the world, 21,000,000, and the shipping of the world, 24,000,000, or a total of 120,000,000 horse power. Of the 75,000,000 horse power used in factories and general industrial and municipal activities of the world, about 13,000,000 is used in the United Kingdom, about 29,000,000 in United States, and 6,000,000 in the British Dominions.

There has been more or less of a popular belief, or illusion, that the gas wells of Alberta were the greatest producers of power, and would continue to be. This conception may have come to pass from several reasons, and no doubt the rather extravagant claims of some of the publicity exploiters of the various centres have much to do with it.

Alberta has a great power proposition. This can be proved in several ways. She has, in the first place, 87 per cent. of the coal deposits of the Dominion, a splendid gas supply with a very high B.T.U. grading, while the waterpower of Alberta is by no means lacking.

The report of Mr. White makes it very plain that he considers that the greatest prime mover that Alberta can develop successfully is found in the steam-electric plant. Water power, owing to high labor costs, is laboring under a heavy, permanent handicap. Gas is an uncertain quantity regarding permanency, and depending on it might lead to serious losses. Regarding coal as a source of power, the report says, "Now, the great source to which Alberta must look for power is her coal. During recent years, the great advance made in the art of the production of steam power is phenomenal. This advancement has given coal, as a prime agency for power development in competition with other prime agencies, almost a premier position. Those interested in the furnishing of power on a wholesale scale in Alberta must make their research into, and selection from, the achievements made in recent years in the field of power produced from coal."

Throwing Away Millions

THIS paper has received from Ottawa a report entitled: "Report of the Administrative Chairman of the Honorary Advisory Council for Scientific Research of Canada."

It may be that the title is too ponderous—at least it is not inviting. Is there a chance for classing this very necessary work under a caption not so deep nor heavy nor forbidding?

The average man is not interested in research work. Those who realize the necessity for it have to fight considerable prejudice to get the necessary support to carry on their undertakings.

Research work as such, does not appeal to the popular fancy. It savors of academic routine, or the fancies of a hobbyist.

But let us approach a stage in our national career, when our natural supplies of raw material start to run short, or when it is very hard to secure them from other sources. Men have to admit, when asked what are we going to do about it, that they don't know what to do. They have no idea of what we have in our own land; they have never been mindful of the national stock takings that have been in order by the not overly-encouraged research workers. But they will be willing enough in their extremity to turn to the work they may have been inclined to merely tolerate when the going was good and the supplies of material were coming through without interruption.

The redeeming feature of the case, as far as the men behind the research work are concerned, is the ease with which they can justify their existence as a national necessity. Take, for instance, just this one statement regarding the matters receiving attention:—

> "The value of the fish waste in Canada, if utilized as it is elsewhere, would be very great. The quantity of solids in the three hundred thousand tons annually thrown away, and comprising chiefly fats and proteins is at least one-fourth of that amount and if subjected to appropriate treatment it ought, at the prices which prevail, and have prevailed, for the last four years, to be worth $10,000,000 or about one-fourth of the annual yield from the fisheries of Canada. The oil, contained in this waste should, if separated and purified, be worth on the market as much as $2,000,000."

So it will be seen that the work is not merely in the line of finding out our natural wealth, but in stopping waste and utilizing material that is at present going to the scrap heap. If we are going to move seriously toward national efficiency we must not only utilize our own materials but see that anything thrown away is good for nothing else.

The council for research work should be encouraged to go ahead. Their activities are such as to class them as national necessities.

The Art of Selling

ONE large Canadian establishment, selling machine tools, as well as other lines, had a meeting of its outside men—dealers—with the idea of making salesmen out of these dealers. The idea is good, the only drawback being on the face of it, viz., that it is impossible to make a salesman in two or three days.

The art of selling is not understood in many places. It is a great business. The real salesman never looks for a job. There are men around wondering when he is going to be through with the work he has in hand. They want to get in touch with him.

The real salesman is not the product of imagination, or of bluff or of glib tongue. He is not a shyster. He does not have to resort to sharp practice.

The trouble with us is that we have not made a business of schooling salesmen in this country. In far too many cases the man applies for a job. He says he is a salesman. He takes your line, puts his little bag under his arm and away he goes to blunder along and do the best he can. He has to make a living so he might as well make it out of you as out of any person else.

But did you ever look at it this way—your salesman is your representative. He is what the outside world, the buyer, sees of your firm.

Does the salesman get this broad view of the case—I am to all intents and purposes the firm? The man with whom I do business never meets the president or the general manager. All he has to draw his conclusions on is myself. If I am straight and clean and honorable in my dealings, if I refuse to resort to petty commissions, to little grafts, and if I do business on the dead level my customer is going to have a good opinion of my firm.

Don't let your men get out on the road half-baked. If you have any traditions that you want maintained tell him what they are. If you insist on certain standards being maintained see that he understands the motive. See to it that your salesmen are schooled, trained to go among men and study them, trained to meet with dignity and ease any position they may face.

Selling is an art—not a job.

If that is your end of the business, aim to be a real representative and salesman—there are plenty of travellers.

More Season-end Wrecks

THE end of the shipping season on the Great Lakes is proving again the possibilities of great loss of life in the attempt to extend the shipping season into the period when changes of winds come quickly, and when the seas are very heavy.

It may be an exaggeration to refer to many of the large lake vessels as fair weather craft, but that is not altogether wide of the mark.

They are long and unwieldy. Their power plant is not such as to give them speed to make for port quickly or right themselves at once in a heavy sea.

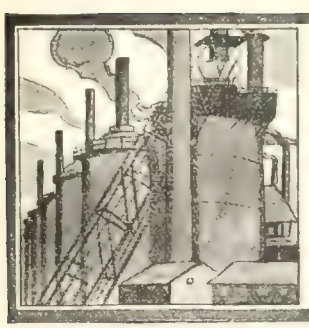
What is the cure? Of suggestions there are no end. Raise the insurance rates? No need to worry about that, as the underwriters will see that that is done as soon as the losses begin to make them lose too much money. Put a deadline on? That is hardly practicable. More signal stations or better service regarding warning vessels of approaching storms? The service that is given on the Great Lakes both by the United States and Canadian departments is good. Very accurate record is kept and displayed of all depressions and warnings are given of anything that may make the lakes dangerous.

The losses that seem to trail along and hang on at the end of the shipping season may be the result of several things. There may be the element of taking a chance. There may be that something that used to make the engineer believe he could make the next switch before the passenger train would get there, or that causes the driver of a flivver to reckon that he can get through between the truck and the street car.

After the great storm of 1913 on the Great Lakes, when the shores were strewn with the bodies of dead men and of wreckage of ships, there was a circular letter sent by the companies urging the captains to consider always the safety of the life and property entrusted to their care.

But warnings have a faculty of getting the edge taken off. That was six years ago, and the storm was an exceptional one. It is not likely to happen again. It's easy to reckon that way, is it not?

It does look as though the one thing that would cut down the tail-end casualty list for the shipping season on the Great Lakes would be the elimination of the "take a chance on one more trip" idea. The Great Lakes, when they get aroused at this season of the year, are no mill ponds. The chances for a lake vessel of low power getting through to safety are mighty small.



MARKET DEVELOPMENTS

Looks Like a Very High Market for Months Yet

Steel Shipments Showing Very Little Improvement—Premiums Are High and Prospects Seem to be That They Will be Higher in the Spring—Deliveries Slow in Tools

IT is hard to figure out anything but a high market for steel products for some time to come. Everything has pointed that way for some time back and things are working out true to form. Production is not at the same stage of efficiency as before the strike. The individual effort on the part of the employee is not the same. In many cases he has been given employment for the moral effect of the employment upon the strikers. He has been spoiled as a good producer.

Again, although the Steel Corporation may set its face against a higher price schedule, there is nothing to hold back the jobbers. The premium business is beginning to flourish now, and by the spring it seems certain that it will be flourishing still more. Some of the dealers also have a suspicion that certain mills will not be inclined to ship as rapidly as they might in the hope that prices will be on a firmer level later on, and they may be able to retard their outgoing material to get caught in this favorable tide.

As far as Canadian industry is concerned the situation is not favorable for the immediate future. There are many places where there have been no shipments coming in for the last six weeks. Dealers contend that they have not retired from the market in certain much-wanted lines, but the effect is much the same. They are so hopelessly overbooked that their delivery schedule runs away on into the second quarter of next year in many cases.

Machine tool dealers face much the same situation. With them it is largely a matter of getting the goods they can sell. There are special machines being brought out and out on the market in the States which are well suited for work that is being done in this country, but there is no chance at all of the Canadian dealers getting any of them because the capacity of the plant making them is in many cases sold out for a year in advance.

Coppers are weaker this week, and so is brass. Other lines in the scrap metal market are fairly firm but there is not much business moving. The Christmas season is always more or less dull with sales away off, and this year is no exception.

WILL THIS DELIVERY QUESTION EVER BE SETTLED FOR KEEPS?

Special to CANADIAN MACHINERY.

MONTREAL, Que., November 27.—Curtailment in production and increased difficulties of transportation, as a result of the delayed settlement of the coal troubles in the States, is now being felt in this locality, not seriously as yet, but nevertheless sufficient to cause some uneasiness as to the winter outlook. While the trade requirements here are not exceptionally heavy, the volume is of such a character that a steady supply is necessary to maintain normal operations in many lines of industry. Actual coal shortage is, so far, not in evidence, but strict conservation will have to be practised to avoid any acute scarcity during the coming months. Where the pressure is felt the most is in the inability to secure material from American producing points, partly due to the shutdown of plants and also to railroad inefficiency. Canadian authorities are doing what they can to relieve the situation, but close co-operation of manufacturers is urgently required to enable the fuel controllers to determine the proportion of coal delivered to this country. There is every reason to believe that Eastern Canada will be able to draw supplies from the Maritime Provinces unless trouble develops in these coal regions. At present there is a strike threatened at the Minto Coal Co., in Sunbury County, N.B. A strike is likely unless a satisfactory settlement is reached within a few days. The chief drawback at the present time is the great difficulty experienced in getting material through from the mills in the States.

In many mills the prices on steel commodities have been advanced, and the impression here appears to be that local quotations willl be raised to conform to the mill advances in the States. Warehouse supplies are being depleted, particularly in sheets and plates. Tubes also are very difficult to obtain, and further supplies are very uncertain.

Normally Sold Until Next June

General disturbances throughout the United States and Europe has resulted in a condition that makes the early future one of marked uncertainty. Outwardly there is little to indicate that the metal situation is other than normal, but apart from the trading in ingot metals, the market is suffering from the inability to obtain sufficient finished materials to take care of the present requirements. Speaking on the existing trade conditions, one dealer stated: "Business in the ingot metals continues steady, but on the finished lines, such as copper and lead sheets, galvanized and black sheets, we are virtually sold until next June. We had a letter from one producer in the States just recently to the effect that they were practically closed down, and for an indefinite period, owing to the shortage of coal and necessary raw materials. We have a number of requests in now for a first chance on any shipments of tin plates and sheets that may come through, but it is seldom that we are in a position to accommodate a customer owing to the material being previously disposed of. In most cases the goods never reach the warehouse, they being transferred direct at the wharf or the freight shed. Warehouse stock on finished sheets and tin plate will continue very low throughout the winter." Ingot quotations are quite firm, with the exception of tin and lead, the former declining one cent. to

57½ cents, and lead ¼ cent to 8¼ cents per pound.

Delivery Affects Business

The thought that is uppermost in the minds of the machine tool dealers is the disturbed character of general conditions, particularly regarding those in the United States, a factor that makes trading very uncertain. Present demand for machine tools and equipment is not heavy, but sufficiently large to sustain the interest of dealers, provided they could assure customers as to the definite date of delivery. Production in the States has been adversely affected by strikes and coal scarcity, a condition that has resulted in curtailment of operations, or as is the case in some places, of temporary suspension. Under the circumstances where new tools are hard to obtain, the inquiry for used equipment is more in evidence, but this field has been pretty well combed of the more desirable machinery. Considerable business is still being done in rebuilt machine tools.

Cast Iron Scrap Up

There is undoubtedly a better market in scrap trading than there has been for some time. The volume of increase is not large, it is true, but dealers are encouraged by the existing inquiry and the sales that are being made. The movement of non ferrous scrap is steady and normal, but the iron and steel lines are the ones that are putting the new life into the present situation. Foundries in general are quite busy, and it is in the cast iron scraps that the demand is so pronounced. Dealers here state that cast iron scrap is almost impossible to get and the market is exceptionally strong. Quotations are advanced from $1 to $4 per ton. Malleable scrap is quoted at $18 on a $3 advance. Machine cast iron shows a similar rise and is quoted at $24. Machine shop turnings at $7.50 is an advance of 50 cents per ton. Stove plate is again up and dealers are paying $22. Cast borings are in good demand and are listed at $10 per ton.

POINTS IN WEEK'S MARKETING NOTES

The matter of delivery is probably the outstanding feature of either the machinery or steel market at the present moment. Bookings in both lines are extended well into the first and second quarters of 1920.

One line of woodworking machinery sent out notices this week that they were announcing a ten per cent. increase on their special lines.

It is now almost six weeks since shipments of plate and sheet have come to some industrial and warehousing interests.

British machine tool makers, in spite of high costs, are making an attempt to get into the American market. The claim is that they are not suffering any more from high costs than are the U. S. makers.

Pittsburgh reports state that the steel mills, although taking on more men and getting better results, are making slow progress toward a normal production. Some experts figure that with present labor conditions it will not be possible to secure 100 per cent. operation.

Shortage of steel and coal is causing some anxious moments in circles where supplies of these have been allowed to run low in recent months.

CONDITIONS LIKE THE BIG WAR YEARS

Doing Business in Machine Tools is Largely a Matter of Making Deliveries

TORONTO.—To one who has done the machinery and steel market in Toronto during war and peace times, it might seem that, during the present, we are back once more to the war-time basis. A couple of years ago, it was largely a case of being able to make deliveries of machinery or steel. To-day, it is the same thing. True, the selling staffs of many concerns are getting drilled and polished for a hard campaign, for there is a realization in many quarters that more vigorous salesmanship is needed to keep things well booked ahead, but for all that, there is the same old problem of deliveries, and it is not improving. It is a safe guess that there will be a tremendous amount of material piled up against the capacity of plants for the coming year.

The Machine Tool Market

Take the market for machine tools at the present time in Canada. It is a question of deliveries. Only this morning, one of the Toronto dealers showed CANADIAN MACHINERY a list of eleven firms to whom certain machines had been sold. Now he gets word that he has been allotted four out of the December shipment, six out of the February shipment, while no promise is made at all for the eleventh on the list. It is up to the dealer to sit down and try to figure out which four are the most urgent, which six are the least urgent, and which is the eleventh that he can stall for some time to come without cancellation. Now it may appear to be easy business on the face of it, but it is not.

Deliveries made to Canada from some of the American makers are not satisfying the dealers here by any means. They hold that, if their principals want to get into this market for keeps, they should make quicker deliveries here. Dealers who are exclusive agents, find it extremely hard to do anything at all for a prospect who wants anything like quick shipment. As one dealer put it to-day: "We are here to make a living, but just now we find quite a number of cases where we can do nothing for a man who wants his goods promptly. We do not want to handle used machinery, or to have to rebuild it, but what are we going to do?"

Other dealers hold that the present rate of exchange is tending to hold back business, and is quite a factor in favor of the Canadian-made machine. The opinion was also expressed that there should be an effort made so that the U.S. tool would not be, between duty and exchange, fifty per cent. higher to the Canadian buyer than to his competitor in the States.

A Serious Matter

Shipments of plate, sheets and tubes of wanted sizes are eagerly looked for just now in this district. In some cases, it is five weeks since there has been anything that looked like metal of these lines coming toward these premises.

Some interests seem to consider that the present is not the right time to buy, and have for that reason been staying out of the steel market. They may be right, but it is hard to see where they figure out the wisdom of such procedure. While some of the larger selling agencies here deny that they have withdrawn —or their mills—on account of too heavy bookings, the chances seem to point to their having to adopt this policy in some form or other. When those who have been staying out of the market start to come back, we fear that they will find a long line of business drawn up ahead of them at any of the mills. In the face of this condition, it is also hard to figure out where they see any cheaper steel for some time to come.

Scrap Is Not Busy

Copper and brass have fallen off during the week, but not enough to cause dealers to mark down prices which they are willing to pay. No. 1 lake ingot is selling, at this writing, for 19¼ in New York.

Some of the large users of brass are just now feeling the effects of the shortage that took place during the war. For instance, the gentleman who was doing the purchasing for the Linotype Co. of Brooklyn during the war, and prior to it, told CANADIAN MACHINERY a good one that illustrated how small peace-time orders looked when war work was at its height. Mr. Archer said: "We had been purchasers, annually, of a million pounds of brass for the making of matrix. During the war, I went down to the city where we placed our business. I thought that the order I was going to place would entitle me to a pretty fair reception, as the purchaser of a million pounds was doing some

business. The first man I fell in with was connected with the Italian Munitions Department, and he was headed for the same plant as I was. When he informed me that he was going down to see if they couldn't raise their deliveries to him from one to two million pounds PER WEEK, I saw where the chances of my million pounds per year were all faded. We are feeling the effects now of the shortage of brass that took place a couple of years ago, because our stock was heavily drawn upon, and we have not been able to catch up." Other lines where brass is used largely have had similar experiences.

THE PREMIUM MARKET WILL BE IN A FLOURISHING SHAPE BY THE SPRING

Special to CANADIAN MACHINERY.

PITTSBURGH, Nov. 27.—The union coal miners are still out, despite the recall of the strike order required by the Federal court. The officials of the miners' union are enjoined from paying strike benefits or encouraging the strike in any way, but there is room for suspicion that the striking miners are being kept in line by self-constituted committees at the individual mines. Meanwhile, negotiations on a wage scale are proceeding in Washington.

The steel industry has not actually suffered from shortage of coal to any extent, and is likely to get through the whole operation without much difficulty. The mills, as a rule, were well stocked with coal, and there are fairly heavy shipments, notwithstanding the strike, the non-union districts being in full operation, while the "open-shop" mines have been producing more or less. In the first full week of the coal strike, production in the United States was 29 per cent. of the average during the four weeks preceding the strike, when production had been particularly heavy, and 37 per cent. of the average during the first ten months of the year. The Connellsville region is non-union, and this helps greatly, as the region ships large quantities of coal, besides the coal it converts into coke in the region.

Steel Strike Crumbling

Last week was the ninth of the iron and steel strike, and during the week the strike was crumbling, instead of waning gradually, as in preceding weeks. The Wheeling district, the strongest strike region in the country, made a beginning of operations. While the beginning was a small one, it was very important. Last week also saw a resumption at the great plant of the Cambria Steel Company at Johnstown, 100 miles east of Pittsburgh, previously entirely closed. More than half of the men reported for work during the week. In the Mahoning Valley and at Cleveland, the resumption of work continued, and at a somewhat more rapid rate than in previous weeks. The Chicago-Gary district got still nearer to a stage of full operation.

The way the steel producers now look at the situation is that the strike is now so nearly over, and the virtual end so plainly in sight, that the strike itself disappears as an important factor, and the situation after the strike is the important matter. The after-effects of the strike will remain for a long time, probably from three to six months, with a labor shortage, as there was before the strike, with working forces more or less demoralized and requiring fresh lining up for efficient operation, and with the men more or less indisposed to do good work. Losing the strike does not make the men more anxious to render efficient service, and during the strike some of the men in employment have been more or less spoiled, because mill managements were so anxious to keep men on the payroll.

Production of steel in August, the last month for which a report of production has been made, was about 80 per cent. of actual capacity, according to a conservative estimate. In the first three weeks of September, just before the strike, production was probably a shade under 85 per cent. When the strike is entirely over, in the sense of there being no strikers left, production will hardly be more than about 75 per cent. of capacity, and it may be some time before an 85 per cent. rate is reached. Doubts are entertained whether it will ever be possible to reach 100 per cent. production with a general labor shortage in the country, such as exists to-day, and is likely to exist, as long as times remain good.

Steel Shortage

In the early weeks of the strike, it seemed strange that so little shortage of steel was in evidence. From the present viewpoint, it appears that this was due to consumers having stocks to fall back upon, for, with production materially greater than a month ago, steel is scarcer than at that time. Consumptive requirements may not increase materially in the next couple of months, but in early spring it is practically certain that requirements will greatly increase in nearly all lines. In addition, a large amount of building, involving the use of structural and other steel, is contemplated, and the only question is how much of it will have to wait. Already, fabricating interests are being asked to set aside jobs they are on and get to work on new jobs, offered at a premium. The railroads are, of course, certain to be in the market for some material when they have bought practically nothing for so long a time. The roads will be returned to their owners January 1, according to schedule, and in all probability the Government guarantee of earnings will be extended for a short time, while Congress determines the position the roads are to occupy eventually.

Keeping the Lid on Prices

The Steel Corporation's policy, decided upon many months ago, of holding the March 21 price schedule from any advances, is now fully worked out into practice, as the corporation subsidiaries have been selling large tonnages of steel for such deliveries as it can make, and all at not above the March 21 prices. For several weeks it has had no tonnage to sell, except for delivery after January 1. The last lines in which the corporation entered the market for 1920 were sheets and tin plates, the American Sheet & Tin Plate Company having opened its books November 15 for contracts with jobbers covering the first quarter of the year, and with large manufacturers for the first half of the year.

The Steel Corporation's policy will be followed by the large independents, generally speaking, but some of those that have been much affected by the strike, finding that it will be some time in March before they can complete their 1919 obligations, are indisposed to sell at this time for the later period. Possibly they hope that conditions later will be such as to permit them to sell at advanced prices, without incurring criticism of their regular customers for not following the Steel Corporation's policy.

The producers who thus sell far ahead, naturally sell only to regular customers of long standing, and when the prospective tonnage is not sufficient to go around, they must cut down inquiries. Their selling at March 21 prices will not necessarily hold the entire market to that level, for the unsatisfied demand will seek steel where it can be found, and that, undoubtedly, would mean premiums being charged by the smaller mills, such as keep their order books relatively clear, so as to profit by delivery premiums when obtainable. Prospects are that the premiums will increase in size and apply to more products, as the months pass. At present, there are premiums on sheets, merchant bars and wire products, also, in many cases, on tubular goods, particularly on large orders for line pipe. A fair guess seems to be that the premium market will be in very flourishing condition through the spring, and it may last longer.

BRITISH BUILDER OF MACHINE TOOLS ENTERING U.S. MARKET

Special to CANADIAN MACHINERY.

NEW YORK, Nov. 27. An abundance of machine-tool business confronts Eastern sellers. The General Electric Co., Schenectady, N.Y., continues an active buyer, its inquiries in the past few weeks totalling nearly 200 tools. The Liberty Starters Co., Poughkeepsie, N.Y., a comparatively new concern, is out with a list of about 100 tools, which will be bought soon, and the Empire Cream Separator Co., Bloomfield, N.J., will buy 40 or 50 machines, to increase its output of milking machines. The Crane Co., Bridgeport, Conn., is inquiring for a few machines, and there are numerous other inquiries for small lots and single tools. November will be one of the best, if not the best, month of the year for many sellers in New York .

During the past week there has been considerable improvement, also, in the demand for cranes. The Follansbee Bros. Co., which is to build a new steel plant, with rolling mills, at Toronto, Ohio, has purchased about 25 cranes, at a total cost close to $500,000. The order was divided between the Morgan Engineering Co., Alliance, Ohio, and the Pawling & Harnischfeger Co., Milwaukee, Wis. The Drain Steel Co., Philadelphia, a new concern, has purchased four cranes, one of them a 100-ton ladle crane, for a new open-hearth steel plant at More, Pa. There have been a number of other small orders. Crane prices are stiffening, with improved business. For some time they have been close to cost, as competition has been keen and the capacity of existing crane manufacturing plants has exceeded the demand since the end of the war.

British Want Trade

One of the interesting developments in the American machine-tool trade, is the entrance of English builders into this market. Although handicapped by high-production costs in England, the English tool builders are making a determined effort to succeed in this market. One large company, Alfred Herbert, Ltd., wil make a determined effort, also, to capture a share of the Canadian market, where it should meet with even greater success, owing to the absence of a customs duty. Alfred Herbert, Ltd., has recently opened a display room on the street level at 54 Bay Street, New York, and is contemplating similar display rooms in Montreal and Toronto. At present, it maintains only an office in Toronto. No definite announcement as to its Canadian plans can be made by the company at this time, however, as arrangements have not been completed.

BIG EXHIBITION OF CANADIAN GOODS IN LONDON, JUNE 3 TO 17

Mr. Lloyd Harris, chairman of the Canadian Mission in London, says:

"I was able to arrange with Mr. Montgomery for the use of the Agricultural Hall, Islington, London, for the purpose of holding an exhibition of Canadian goods in June of next year. I am strongly of the opinion that if Canadian manufacturers will support this exhibition, and go there for the purpose of receiving business, that the results will more than justify the effort and expense involved, and I sincerely hope that the Canadian Manufacturers' Association will do everything possible to follow it through to a successful conclusion and thus follow up the pioneer work done by the Canada Mission."

Mr. H. Greville Montgomery has accompanied Mr. Lloyd Harris to Canada for the purpose of promoting this great Canadian exhibition. He has had twenty-five years experience as a promoter of trade exhibitions.

Place

The Royal Agricultural Hall is London's second largest exhibition building and is near the heart of the city. It has a floor space of 60,000 sq. ft. splendidly adapted for exhibition purposes. Trade exhibitions are most important factors in the United Kingdom for bringing buyers and sellers together. They are promoted for the single purpose of developing trade.

To this exhibition buyers of goods throughout the United Kingdom will be invited by free ticket. It will be advertised in all the trade papers as well as in the London daily and provincial papers. A well-known artist will be engaged to prepare a suitable poster for street hoardings and railway stations throughout the country. The fact that this is the first time that any of the Dominions has had a great exhibition run exclusively in its own interest, will ensure wide publicity and great interest.

Canadian Organization

Mr. Montgomery has appointed Mr. O. C. Pease, 41 Victoria Street, Toronto, as his agent. He will allot space, arrange for transportation, receive monies, and conduct the general business of the exhibition on this side.

It is suggested that the following class of articles, all of which are in great demand in Europe, form the main exhibits: Minerals, chemicals, iron and steel products, railroad equipment, hand tools and shelf hardware, agricultural machinery, road-making machinery, transmission machinery, tin and enamel ware, sheet metals, general building materials, textiles, clothing, footwear, pulp and paper, furniture, provisions, canned goods, animal products, confectionery, leather, paints and varnishes, brushes, wood products, rubber goods, carbides, asbestos products, and all other goods of Canadian manufacture which are seeking the world's markets.

Transportation, Storage, Cost of Space

Instructions will be sent to all exhibitors in respect to transportation. It is anticipated, however, that arrangements will be made to assemble all exhibits in Montreal not later than May 1 next, in order that they may be timed to arrive in London about the middle of that month. Each exhibit should bear the name of the exhibitor and other necessary information. They will be shipped direct to the Royal Agricultural Hall and will be placed in their respective positions by the exhibition staff. Mr. Montgomery is charging a flat rate of $1 per square foot of space.

Applications

Inquiries and applications for space should be sent direct to Mr. O. C. Pease, 41 Victoria Street, Toronto. Plans and full particulars will be sent on request.

The Canadian Manufacturers' Association in this regard, state:

"We consider this a splendid opportunity for manufacturers seeking an outlet for their goods in Great Britain and Europe. Those who participate in this exhibition will find that, instead of having to seek their customers, they will be brought to them. They will not only meet the distributors to the United Kingdom, but indent houses who are distributing abroad. Canadian troops have introduced Canada to the world. The Canadian Mission has followed this by obtaining an outlet for Canadian products valued at upwards of $100,000,000. It now rests with Canadian manufacturers to follow up this splendid pioneer work and show the world that we are producing a great variety of articles for which there is a tremendous demand. The association will do everything possible to facilitate this unique opportunity."

Merger Announced.—The Bridgeford Machine Tool Works of Rochester, New York, and the Betts Machine Company, formerly of Wilmington, Delaware, take pleasure in announcing a merger; the consolidation of the two companies, to be known as Betts Machine Company. The Bridgeford Machine Tool Works has specialized in building heavy engine lathes and axle lathes. The Betts Machine Company has been building heavy-duty machine tools for nearly sixty years. Bridgeford lathes and Betts heavy machine tools will hereafter be built by the Betts Machine Company, at their new plant in Rochester, and distributed by the Betts Machine Company, from Rochester and through their offices and representatives in New York, Chicago, Cleveland, and other large cities.

SELECTED MARKET QUOTATIONS

Being a record of prices current on raw and finished material entering into the manufacture of mechanical and general engineering products.

PIG IRON

Grey forge, Pittsburgh	$27 15
Lake Superior, charcoal, Chicago	34 60
Standard low phos., Philadelphia	$38 00-40 00
Bessemer, Pittsburgh	29 35
Basic, Valley furnace	25 75
Toronto price:—	
Silicon..2.25% to 2.75%	$32.75 to $35.75

IRON AND STEEL

Per lb. to Large Buyers	Cents
Iron bars, base, Toronto	$ 4 25
Steel bars, base, Toronto	4 25
Steel bars, 2 in. to 4 in. base	5 50
Steel bars, 4 in. and larger base	6 00
Iron bars, base, Montreal	3 75
Steel bars, base, Montreal	3 75
Reinforcing bars, base	4 50
Steel hoops	5 50
Norway iron	11 00
Tire steel	5 50
Spring steel	8 00
Brand steel, No. 10 gauge, base	4 40
Chequered floor plate, 3-16 in.	6 50
Chequered floor plate, ¼ in.	6 25
Staybolt iron	8 00
Bessemer rails, heavy, at mill	....
Steel bars, Pittsburgh	2 35
Tank plates, Pittsburgh	2 65
Structural shapes, Pittsburgh	2 45
Steel hoops, Pittsburgh	3 05
F.O.B., Toronto Warehouse	
Small sapes	4 25
F.O.B. Chicago Warehouse	
Steel bars	3 62
Structural shapes	3 72
Plates	3 90
Small shapes under 3"	3 62

FREIGHT RATES

Pittsburgh to Following Points	Per 100 Pounds. C.L.	L.C.L.
Montreal	33	45
St. John, N.B.	41½	55
Halifax	49	64½
Toronto	27	39
Guelph	27	39
London	27	39
Windsor	27	39
Winnipeg	89½	135

METALS

	Gross.	
Lake copper	$24 25	$25 00
Electro copper	24 00	25 00
Castings, copper	23 50	25 00
Tin	57 50	58 00
Spelter	10 00	10 50
Lead	8 25	8 50
Antimony	10 50	10 50
Aluminum	33 00	35 00

Prices per 100 lbs.

PLATES

	Montreal	Toronto
Plates, ¼ up	$ 4 50	$ 4 75
Plates, 3-16 in.	4 90	5 25

Price List No. 38

WROUGHT PIPES

Standard Buttweld

⅛ in.	$ 6 00	$ 8 00
¼ in.	4 68	6 81
⅜ in.	4 68	6 81
½ in.	6 21	7 78
¾ in.	7 82	9 95
1 in.	11 56	14 71
1¼ in.	15 64	19 90
1½ in.	18 70	23 76
2 in.	25 16	32 01
2½ in.	40 37	51 19
3 in	52 79	66 94
3½ in.	67 16	84 18
4 in.	79 57	99 74

Standard Lapweld

2 in.	38 81	35 34
2½ in.	42 12	52 36
3 in.	55 08	68 47
3½ in.	69 00	86 94
4 in.	81 75	103 00
4½ in.	93	1 18
5 in.	1 08	1 37
6 in.	1 40	1 78
7 in.	1 83	2 32
8L in.	1 93	2 44
8 in.	2 22	2 81
9 in.	2 66	3 36
10L in.	2 46	3 12
10 in.	3 17	4 02

Terms 2% 30 days, approved credit.

Freight equalized on Chatham, Guelph, Hamilton, London, Montreal, Toronto, Welland.

Prices—Ontario, Quebec and Maritime Provinces

WROUGHT NIPPLES

4" and under, 60%.
4½" and larger 50%.
4" and under, running thread, 30%.
Standard couplings, 4" and under, 40%, 4½" and larger, 20%.

OLD MATERIAL

Dealers' Average Buying Prices.

	Per 100 Pounds. Montreal	Toronto
Copper, light	$15 00	$13 75
Copper, crucible	18 00	18 00
Copper, heavy	18 00	18 00
Copper wire	18 00	18 00
No. 1 machine composition	16 50	16 75
New brass cuttings	13 00	10 75
Red brass cuttings	14 50	14 75
Yellow brass turnings	9 00	9 00
Light brass	7 50	7 00
Medium brass	9 00	7 75
Scrap zinc	6 00	6 00
Heavy lead	5 00	5 25
Tea lead	3 75	3 50
Aluminum	18 00	18 00
	Per Ton.	Net
Heavy melting steel	13 50	13 50
Boiler plate	13 50	11 00
Axles (wrought iron)	20 00	20 00
Rails (scrap)	14 50	13 50
Malleable scrap	18 00	17 00
No. 1 machine cast iron	24 00	22 00
Pipe, wrought	10 00	5 00
Car wheels	20 00	20 00
Steel axles	20 00	20 00
Mach. shop turnings	7 50	7 00
Stove plate	22 00	21 00
Cast boring	10 00	9 00

BOLTS, NUTS AND SCREWS

	Per Cent.
Carriage bolts, ⅜" and less	35
Carriage bolts, 7-16 and up	15
Coach and lag screws	50
Stove bolts	65
Wrought washers	50
Elevator bolts	25
Machine bolts, 7-16 and over	40
Machine bolts, ⅜" and less	40
Blank bolts	25
Bolt ends	25
Machine screws, fl. and rd. hd., steel	27½
Machine screws, o. and fil. hd., steel	10
Machine screws, fl. and rd. hd., brass	net
Machine screws, o. and fil. hd., brass	net
Nuts, square blank	add $0 75
Nuts, square, tapped	add 1 00
Nuts, hex., blank	add 1 00
Nuts, hex., tapped	add 1 25
Copper rivets and burrs, list less	15
Burrs only, list plus	25
Iron rivets and burrs	40 and 5
Boiler rivets, base ¾" and larger	$8 50
Structural rivets, as above	8 40
Wood screws, O. & R., bright	75
Wood screws, flat, bright	77½
Wood screws, flat, brass	55
Wood screws, O. & R., brass	55½
Wood screws, flat, bronze	50
Wood screws, O. & R., bronze	47½

MILLED PRODUCTS

(Prices on unbroken packages)

	Per Cent.
Set screws	50
Sq. and Hex. Head Cap Screws	45
Rd. and Fil. Head Cap Screws	20
Flat But. Hd. Cap Screws	10
Fin. and Semi-fin. nuts up to 1 in.	45
Fin. and Semi-fin. nuts, over 1 in., up to 1½ in.	40
Fin. and Semi-fin. nuts over 1½ in., up to 2 in.	25
Studs	30
Taper pins	50
Coupling bolts	10
Planer head bolts, without fillet, list	10
Planer head bolts, with fillet, list plus 10 and	net
Planer head bolt nuts, same as finished nuts.	
Planer bolt washers	net
Hollow set screws	net
Collar screws	list plus 20, 30
Thumb screws	40
Thumb nuts	75
Patch bolts	add 20
Cold pressed nuts to 1½ in.	add $1 00
Cold pressed nuts over 1½ in.	add 2 00

BILLETS

	Per gross ton
Bessemer billets	$38 50
Open-hearth billets	38 50
O.H. sheet bars	42 00
Forging billets	51 00
Wire rods	52 00

Government prices.

F.O.B. Pittsburgh.

NAILS AND SPIKES

Wire nails	$4 70
Cut nails	4 75
Miscellaneous wire nails	60%
Spikes, ⅜ in. and larger	$7 50
Spikes, ¼ and 5-16 in.	8 00

ROPE AND PACKINGS

Drilling cables, Manila	0 39
Plumbers' oakum, per lb.	0 10
Packing, square braided	0 38
Packing, No. 1 Italian	0 44
Packing, No. 2 Italian	0 36
Pure Manila rope	0 37
British Manila rope	0 31
New Zealand hemp	0 31
Transmission rope, Manila	0 43
Cotton rope, ¼-lb. and up	0 74

POLISHED DRILL ROD

Discount off list, Montreal and Toronto ..... net

MISCELLANEOUS

Solder, strictly	$ 0 34
Solder, guaranteed	0 39
Babbitt metals	18 to 70
Soldering coppers, lb.	0 58
Lead wool, per lb.	0 14
Putty, 100-lb. drums	6 75
White lead, pure, cwt.	17 80
Red dry lead, 100-lb. kegs, per cwt.	15 50
Glue, English	0 35
Tarred slater's paper, roll	1 30
Gasoline, per gal., bulk	0 33
Benzine, per gal., bulk	0 32
Pure turpentine, single bbls., gal.	1 50
Linseed oil, raw, single bbls.	2 90
Linseed oil, boiled, single bbls.	2 92
Plaster Paris, per bbl.	4 50
Sandpaper, B. & A.	List plus 43
Emery cloth	List plus 37½
Sal Soda	0 03½
Sulphur, rolls	0 05
Sulphur, commercial	0 04½
Rosin "D," per lb.	0 07
Rosin "G," per lb.	0 08
Borax crystal and granular	0 14
Wood alcohol, per gallon	2 00
Whiting, plain, per 100 lbs.	2 50

CARBON DRILLS AND REAMERS

S.S. drills, wire sizes up to 52	40
S.S. drills, wire sizes, No. 53 to 80	50
Standard drills, all sizes	50
3-fluted drills, plus	10
Jobbers' and letter sizes	50
Bit stock	40
Ratchet drills	15
S.S. drills for wood	40
Wood boring brace drills	25
Electricians' bits	30
Sockets	50
Sleeves	50
Taper pin reamers	net
Drills and countersinks	list plus 10
Bridge reamers	50
Centre reamers	10
Chucking reamers	net
Hand reamers	10
High speed drills, list plus	10 to 40
Canadian high speed cutters	net
American	plus 40

COLD ROLLED SHAFTING

At mill	list plus 5%
At warehouse	list plus 25%

Discounts off new list. Warehouse price at Montreal and Toronto

IRON PIPE FITTINGS

Malleable fittings, class A, 20% on list; class B and C, net list. Cast iron fittings, 15% off list. Malleable bushings, 25 and 7½%; cast bushings, 25%; unions, 45%; plugs, 20% off list. Net prices malleable fittings; class B black, 24½c lb.; class C black, 15¾c lb.; galvanized, class B, 34c lb.; class C, 24½c lb. F.O.B. Toronto.

SHEETS

	Montreal	Toronto
Sheets, black, No. 28	$ 6 55	$ 6 75
Sheets, black, No. 10	5 15	5 65
Canada plates, dull, 52 sheets	8 50	7 10
Can. plates, all bright.	8 50	8 00
Apollo brand, 10¾ oz. galvanized	....	....
Queen's Head, 28 B.W.G.	....	....
Fleur-de-Lis, 28 B.W.G.	....	....
Gorbal's Best, No. 28	....	....
Colborne Crown, No. 28.	....	....
Premier, No. 28 U.S.	....	8 20
Premier, 10¾ oz.	....	8 50
Zinc sheets	20 00	20 00

PROOF COIL CHAIN

(Warehouse Price)

B

¼ in., $13.00; 5-16, $11.00; ⅜ in., $10.00; 7-16 in., $9.80; ½ in., $9.75; ⅝ in., $9.20; ¾ in., $9.30; ⅞ in., $9.50; 1 in., $9.10; Extra for B.B. Chain, $1.20; Extra for B.B.B. Chain, $1.80.

ELECTRIC WELD COIL CHAIN B.B.

⅛ in., $16.75; 3-16 in., $15.40; ¼ in., $13.00; 5-16 in., $11.00; ⅜ in., $10.00; 7-16 in., $9.80; ½ in., $9.75; ⅝ in., $9.50; ¾ in., $9.30.

Prices per 100 lbs.

FILES AND RASPS

	Per Cent.
Globe	50
Vulcan	50
P.H. and Imperial	50
Nicholson	32½
Black Diamond	27½
J. Barton Smith, Eagle	50
McClelland, Globe	50
Delta Files	20
Disston	40
Whitman & Barnes	50
Great Western-American	50
Kearney & Foot, Arcade	50

BOILER TUBES.

Size.	Seamless	Lapwelded
1 in.	$27 00	$.....
1¼ in.	29 00	.....
1½ in.	29 50	26 00
1¾ in.	32 00	26 00
2 in.	31 00	26 00
2¼ in.	35 00	28 00
2½ in.	43 00	32 00
3 in.	48 00	40 00
3½ in.	.....	41 00
3½ in.	60 00	42 00
4 in.	75 00	56 00

Prices per 100 ft., Montreal and Toronto

OILS AND COMPOUNDS.

Castor oil, per lb.	
Royalite, per gal., bulk	22½
Palacine	25½
Machine oil, per gal.	36
Black oil, per gal.	16
Cylinder oil, Capital	62
Cylinder oil, Acme	45
Standard cutting compound, per lb.	0 06
Lard oil, per gal.	$2 60
Union thread cutting oil, antiseptic	88
Acme cutting oil, antiseptic	37½
Imperial quenching oil	39½
Petroleum fuel oil, bbls. net	8

BELTING—No 1 OAK TANNED

Extra heavy, single and double	30%
Standard	30, 10%
Cut leather lacing, No. 1	2 20
Leather in sides	1 75

TAPES

Chesterman Metallic, 50 ft.	$2 00
Lufkin Metallic, 603, 50 ft.	2 00
Admiral Steel Tape, 50 ft.	2 75
Admiral Steel Tape, 100 ft.	4 45
Major Jun. Steel Tape, 50 ft.	3 50
Rival Steel Tape, 50 ft.	2 75
Rival Steel Tape, 100 ft.	4 45
Reliable Jun. Steel Tape, 50 ft.	3 50

PLATING SUPPLIES

Polishing wheels, felt	4 00
Polishing wheels, bull-neck	2 25
Emery in kegs, American	06
Pumice, ground	06
Emery glue	35
Tripoli composition	09
Crocus composition	12
Emery composition	10
Rouge, silver	50
Rouge, powder, nickel	45

Prices per lb.

ARTIFICIAL CORUNDUM

Grits, 6 to 70 inclusive	.08¼
Grits, 80 and finer	.6

BRASS—Warehouse Price

Brass rods, base ½ in. to 1 in. rod	0 34
Brass sheets, 24 gauge and heavier, base	$0 42
Brass tubing, seamless	0 46
Copper tubing, seamless	0 48

WASTE

XXX Extra	19½	Atlas	17
Peerless	19	X Empire	15½
Grand	18	Ideal	16
Superior	18	X Press	14
X L C R	17		

Colored

Lion	15	Popular	12
Standard	13½	Keen	10½
No. 1	13½		

Wool Packing

Arrow	25	Anvil	15
Axle	20	Anchor	11

Washed Wipers

Select White	11	Dark colored	09
Mixed colored	10		

This list subject to trade discount for quantity.

RUBBER BELTING

Standard ... 10% Best grades ... 15%

ANODES

Nickel	.58 to .65
Copper	.38 to .45
Tin	.70 to .70
Zinc	.18 to .18

Prices per lb.

COPPER PRODUCTS

	Montreal	Toronto
Bars, ½ to 2 in.	$42 50	$43 00
Copper wire, list plus 10..		
Plain sheets, 14 oz., 14x60 in.	46 00	44 00
Copper sheet, tinned, 14x60, 14 oz.	48 00	48 00
Copper sheet, planished, 16 oz. base	46 00	45 00
Braziers', in sheets, 6 x 4 base	45 00	44 00

LEAD SHEETS

	Montreal	Toronto
Sheets, 3 lbs. sq. ft.	$10 75	$11 50
Sheets, 3½ lbs. sq. ft.	10 50	11 00
Sheets, 4 to 6 lbs. sq. ft.	10 25	10 50

Cut sheets, ½c per lb. extra.
Cut sheets to size, 1c per lb. extra.

PLATING CHEMICALS

Acid, boracic	$ .25
Acid, yhdrochloric	.04
Acid, nitric	.10
Acid, sulphuric	.04
Ammonia, aqua	.13
Ammonium, carbonate	.20
Ammonium, chloride	.22
Ammonium hydrosulpuret	.50
Ammonium sulphate	.30
Arsenic, white	.14
Copper, carbonate, annhy	.41
Copper, sulphate	.16
Cobalt, sulphate	.20
Iron perchloride	.62
Lead acetate	.30
Nickel ammonium sulpate	.16
Nickel carbonate	.32
Nickel sulpate	.18½
Potassium carbonate	.50
Potassium sulphide (substitute)	.42
Silver chloride (per oz.)	1.25
Silver nitrate (per oz.)	1.20
Sodium bisulphate	.18
Sodium carbonate crystals	.06
Sodium cyanide, 127-130%	.38
Sodium hyposulphite per 100 lbs	8.00
Sodium phosphate	.18
Tin chloride	1.75
Zinc chloride, C.P.	.30
Xinc sulphate	.08

Prices per lb. unless otherwise stated

The Week's Events in Montreal Industry

The port of St. John, N.B., is partially tied up owing to the strike of the freight handlers. Temporary inconvenience is expected in the loading and unloading of ocean steamers.

The Hyde Engineering Company, of 175 McCord Street, Montreal, who have been extensively engaged in marine repair work during the past season, are looking about for a manufacturing line for the winter months.

J. A. DeCew, chemical engineer, and president of the Bishill Wire Machinery Company of Montreal, was in the city for a few days last week, and has returned to New York to negotiate new activities in connection with early developments in the company's business.

The Wheeler Life Belt and Fireproofing Company will remove from the present premises, 652 St. Paul Street West, to more commodious quarters as soon as these can be obtained. They purpose going in for the manufacture of mattresses in addition to their present lines.

Work on the Montreal improvements and extensions are progressing favorably. Considerable work has already been done on all of these, and it is expected that the two sheds on Victoria Pier, and the power plant for the electric roads, will be ready for operation next spring.

Frank Morrison, secretary of the American Federation of Labor, was in Montreal this week making arrangements for the annual convention of that body, the convention to be held in the Canadian metropolis next year. The number of delegates will depend on the accommodation facilities of the city.

Two men were killed and quite a number more or less seriously injured as a result of a head-on collision on the C. P. R. near St. Vincent de Paul, on the Island of Montreal last Saturday evening. It is thought that the steamship special overran the signals and collided with the local train.

Geo. E. Leighton, of 136 St. James Street, Montreal, the well-known consulting mining engineer, has recently been appointed vice-president of the Samuel Osborne Company of Canada, with head offices at 145 St. James Street, steel dealers and tool manufacturers. Mr. Leighton has just returned from a two months' business trip to England.

Damage to the extent of about $25,000 was done to the building of the Montreal Warehouse Co. on Wellington Street, Montreal, by a fire that visited the place last week. At the time of the fire the place contained a large quantity of leather hides, hundreds of barrels of pitch tar, automobiles, tractors and motor trucks, many of the latter being badly damaged by fire and water.

The Canada Steamship Company has acquired another 9,000-ton vessel which they intend placing on the route between New York and the West Indies. This vessel was purchased from American interests and the name will be changed from the "Shoshone" to the "Manoa." She has accommodation for 125 first-class passengers and 100 third-class passengers, and about 4,500 tons of freight.

Shortly after nine last Saturday evening fire attacked the main building of the Laval University of Montreal, starting in an upper storey. An explosion of chemicals added to the conflagration, and it was nearly seven the following morning before the fire was declared "out." The main building is completely gutted. The loss will be in the neighborhood of half a million dollars

E. N. Davey, who has been in charge of the tool room of the United Shoe Machinery Company, of Montreal, has resigned from that position to enter business for himself, as a practical mechanician. He has acquired a small but well-equipped shop at 1227 Ontario Street East, and will go in for the manufacture of small precision tools and fixtures, automobile and general repair work; also oxy-acetylene welding and cutting.

The launch of the "Canadian Planter" last Saturday from the yard of the Canadian Vickers Company, is the seventh vessel to leave this shipyard this season. This most recent addition is one of those constructed for the Canadian Government merchant marine, and is similar in every respect to five others that have been delivered this year by Vickers. She is approximately 400 feet in length, 52 feet beam, and about 31 feet deep. In all probability this will be the last launch of the season, and, should the weather show signs of early winter it may be necessary to send the boat to Quebec for final fitting out. The yard will continue active throughout the winter as they have still six vessels on order, four for the Canadian Government and two for Norwegian interests.

BELIEVES THAT DEALER SHOULD HAVE AN ORGANIZATION HERE

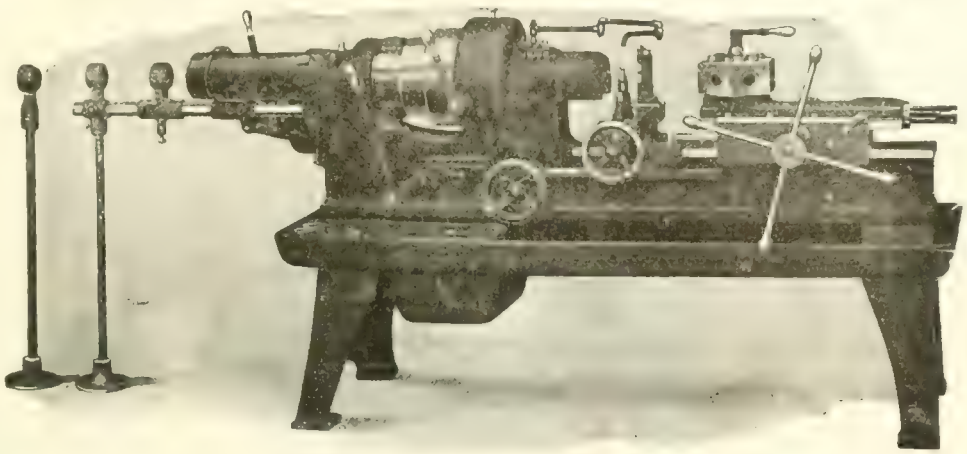
"I think there should be some sort of an organization for the machine tool dealers in Canada, or at least in this district," said the president of one of the machine tool firms in Toronto to CANADIAN MACHINERY this week. "There are a number of matters," he continued, "that could be dealt with to advantage. But for the immediate present, I would suggest that the most important matter is the matter of discounts and general selling policy. To tell you what I mean, let us take a case, and it is not a fictitious case either, but one that does happen time and time again, and any machine-tool man will tell you that he has encountered such instances quite frequently. Smith is the customer, and he has four machine-tool salesmen coming in to call on him at various times. They all have machines that will do the work he wants, and they have good machines, and their prices are the same. Now, in that case, the only thing that should determine the sale would be the matter of delivery, or the ability of some one of the four salesmen to show that his machine has points for the job that will make it a more acceptable machine. But what happens? One of the four sits down and begins to figure out how he can land that order. Now, that is all right. Salesmen are out to sell, and they are expected to show results. So he figures that the machine sells for $1,000 at the factory in the States. He bases his price on $1,000, adds 35 per cent. duty. This should bring the price up to $1,350; but he reckons that he can afford to slip one over by basing the duty on $900, and bring the selling price to $1,315, showing his customer a saving of $35. Not much, you say. Perhaps not, but, in many cases, enough to turn a sale, for you must remember that we are only basing our calculation on $1,000, and the average sale is much in excess of that.

"Well, now, what happens? Smith buys three machines, and the salesman gets away with the business. Smith runs into another manufacturer who has purchased the same machine under less strenuous circumstances. He finds out that Smith has secured a better price than he has, and he immediately wakes up to the fact that he has been soaked, and that is the truth of the matter. He has been soaked, simply because he did not have them all there competing for his business. It is a poor way to carry on, but it is being done. The machine-tool salesmen could settle all that in a few minutes, were they to come together and think the question over seriously. There would be no hold-up, and no need of an increase in prices, but there would be the elimination of one of the worst features in the business, viz., the special concession that is figured out to secure an order, when there is competition for it."

Warner & Swasey Screw Machines

For large output and close limits—If you are figuring on screw machine work you can depend on W. & S. machines being right for the job.

We can supply you from stock immediately.



The A. R. Williams Machinery Company, Limited

ST. JOHN, N.B.
WINNIPEG, VANCOUVER

"If It's Machinery, Write Williams"

64 Front Street West
TORONTO

Acid Electric STEEL CASTINGS

Acid Electric Steel Castings show superior ability to resist wear and crystallization. They are smooth in texture, free from Blow Holes, and machine perfectly. We specialize in

Railroad and Other High Grade Castings

up to 15 tons, any specification. Electric Steel Castings COST NO MORE than ordinary Steel Castings.

Prices on Application—Prompt Deliveries

The Thos. Davidson Mfg. Co., Limited

Steel Foundry Division, Lachine Canal

Head Office: 187 Delisle St. MONTREAL

Phone Victoria 1492

MORROW SCREWS MORROW

MORROW

Set and Cap Screws and Twist Drills may be had of the better jobbers in any part of Canada. The screws are made from material specially made for this purpose and each screw is threaded twice to give accuracy.

DRILLS

are manufactured from Jessops' steel (Sheffield, England). It is the highest quality obtainable. Our special temper gives you the perfect Drill which does more work with less regrinding.

SCREWS

Standard Cap and Set Screws or A.L.A.M. or S.A.E. carried in stock. Shipments at once.

WORKS AT INGERSOLL, CANADA

"Ingersoll Files Cut Faster and Wear Longer"

2

DRILLS FILES

MORROW MORROW NUTS MORROW

If interested tear out this page and place with letters to be answered.

Trade Conditions in Old Country Works

In all Scotch steelworks the demand for ship and boiler plates is more urgent than it has been since Government orders ceased, and some makers cannot name a delivery date before January, even for specifications, which formerly would have been run off in a week's time. The extensions of works, meantime, are of no avail in permitting of makers meeting the demands made upon them. One department is standing out as an exception—viz., sectional material—which has fallen appreciably in the general demand. Makers are directing their attention more to meet shipbuilders' requirements. In malleable iron centres there is no cessation of activity, and makers of late have struck a good seam, from which substantial business may be looked for for some time. So many enterprises were hung up during the war that, now that they are being brought to light, makers are being rushed to provide the ways and means. Production could be widened if only labor would realize its national obligations and play the game.

No American Pig Iron

The talk of the prospect of American pig iron being soon dumped down in the Old Land appears to have evaporated, and, so long as freights remain high and facilities so uncertain, Scotch ironmasters have little to disturb their peace of mind with respect to the huge profits accruing to this particular industry. Another point is that the rise and fall in the value of the American dollar checks business.

A Great Wire-rod Mill

The past month has seen the formal starting of the big Morgan continuous wire-rod mill at Templeborough. The only other mill of this type is in South Wales, but it differs from the above in several important particulars, and is not so large. The mill converts a steel billet into a coil of wire rod in a single heat and without handling, all the work being automatic. The plant is capable of rolling nearly 1,500 tons of wire rod per week. The material in question is the raw material of the wire trade, and more than 100,000 tons per annum were imported from the Continent before the war. It is pleasing to learn that this country is now in a position to supply from internal sources all the rods that the wire trade requires. The prices at which the material is being offered also leave no inducement to users to place any of their business abroad. The adoption of improved methods of manufacture has enabled the rod rollers to reduce costs, and it only needs constant output to maintain this favorable condition. Wire makers almost without exception are extremely busy. So great is the demand from the home market that they have little to spare for export, and some amount of foreign trade is being turned away.

The Lot of the Manufacturers

Neither the recent grave disturbances in industry nor the state of the foreign exchanges has checked the inflow inquiries and orders for manufactured steel and steel tools. While the demand omits a number of Sheffield's staple materials, it is sufficient to provide a lot of work for the majority of the manufacturers. The talk about our markets being flooded with foreign merchandise turns out to be a bogey. The quantities which Germany is in a position to export are at present inconsiderable, and the United States, suffering as she is from an epidemic of strikes in all her trades, has little in the way of manufactures to spare for outside customers. Owing to the cause named, the output of steel in America has suffered a heavy drop of late, and it does not suffice for home needs. The British employer has much to contend with, but, bad as things are here, they are far worse in America, Sweden, Germany, and France. As regards British trade, Italy is proving to be a very unsatisfactory market. Her financial position is grave, and many of the works have had to close through inability to trade. Large stocks of steel obtained for war purposes remain in the country. Steel orders from the United States and Canada have been extremely limited for a long period, and not much of this trade which was lost during the war has been recovered up to the present time. Before the war both countries were big buyers of our most expensive tool steel. Formerly, Germany obtained her best razor and cutlery steel from Sheffield. Since the armistice was signed no orders from that country have been received in Sheffield, nor is business possible at the present rate of exchange. Cutlery steel would cost the Germans something like 5s. or 6s. per pound to-day.

THE CARE OF BELTS

(By J. H. WALKER, Mgr. Dominion Belting Co., Ltd.)

There are very few users of belts who give them the proper care. In the first place, they should be put on with clamps, or other means adopted, to take all the stretch possible out before lacing or attaching with other fasteners.

Every belt should have a proper dressing applied occasionally to keep it in condition. By this means drying out is prevented, and belts retain their gripping qualities on pulleys, which means a retention of the original power transmission.

A belt dressing containing resin or mineral oils should not be used, as these ingredients are most detrimental. Never use a belt dressing containing animal oils on rubber, balata, or stitched cotton duck belting.

The proper time to apply belt dressing is when the plant is closed down for a day or so; for instance, Saturday, as by Monday morning it has had a chance to penetrate the belt and keep it soft and pliable.

If kept in this condition there is no excuse for anyone resorting to the questionable remedy of applying resin, or any sticky dressing to get the proper power out of belts.

Belts used in saw mills and other plants that are shut down during the winter months should be taken off, rolled up, and kept in a warm place. If left on the pulleys and exposed to the changeable atmospheric conditions of a Canadian winter they will certainly have deteriorated by the spring.

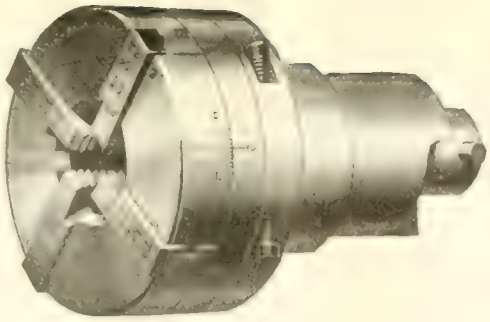
Carelessness in starting up machinery too quickly is liable to cause belts to slip on pulleys, thus injuring them. This can be obviated by putting on the power gradually, which gives belts a chance to get a grip on the pulleys.

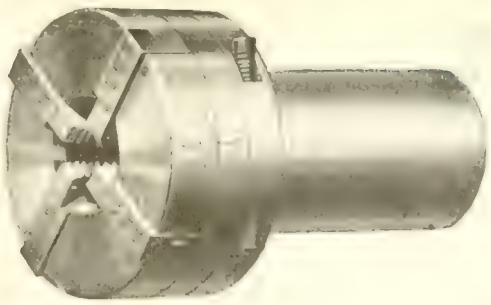
Another important matter is to have proper alignment of pulleys, as many belts give out before their time owing to defects in this respect.

Another mistake made by some belting users is practising false economy in getting belts too light for the work they have to do. While a certain weight of belt may at first do the work required, if it is necessary to keep it on a constant strain to accomplish this, both felt and machinery are going to wear out much faster if there is a "reserve." In other words, heavy enough belts should be used to ensure their not being overstrained. This may cost a little more at first, but pays in the long run.

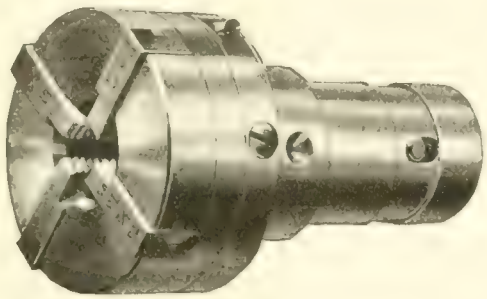
MUNITIONS PLANT OFFERED FOR SALE

The United States Government has been settling with Canadian companies which had entered into contracts for manufacture of war material. The process of making adjustments was rather lengthy in many cases, and there was a good deal of impatience in connection with the delay. The work has been proceeding slowly, however, and several adjustments of importance have been announced. A final settlement was made with the directors of Motor Trucks, Ltd., of Brantford. This plant was built in the final months of the war, and had barely commenced production when the armistice was signed. Expensive equipment was installed, and the plant was regarded as one of the finest of its kind in the province. The United States Government retains the possession of the building, and an effort will be made to dispose of it. An announcement was made in the "Brantford Expositor" that several offers had been made for the building, but that it is still unsold.





Geometric Solid Adjustable Die Heads



When one uses the word "ONLY," he needs to be sure of what he is talking about. With confidence we use the word in saying that a Geometric Solid Adjustable Die Head, fitted with a set of milled dies, is the only solid die head that will back off without stripping the thread.

Geometric Solid Adjustable Die Heads may be fitted with either a releasing shank, plain shank, or with special shank for the Gridley Automatics. The releasing shank permits the head to disengage from the shank upon completion of the thread. The plain shank fits the head for use on the turret of a lathe or on a live spindle, such as a drill press.

Apart from the fact that it is not equipped with the self-opening feature or the roughing and finishing attachment, the Geometric Solid Adjustable Die Head is the same in principle and construction and will do equally as accurate work as the other styles of Geometric Die Heads.

Whatever the requirements, there is a type of Geometric Die Head best adapted to the work.

THE GEOMETRIC TOOL COMPANY

NEW HAVEN CONNECTICUT

Canadian Agents:

Williams & Wilson, Ltd., Montreal. The A. R. Williams Machinery Co., Ltd., Toronto, Winnipeg, St. John, N.B.

Canadian Fairbanks-Morse Co., Ltd., Manitoba, Saskatchewan, Alberta.

If interested tear out this page and place with letters to be answered.

SHEET SHORTAGE BEING FELT NOW

Kitchener Firm Has Not Had a Shipment for Some Weeks Past

Kitchener.—"Yes, we do feel the effects of it." Manager A. S. Capwell of the Canadian Blower and Forge Company, Ltd., said when asked whether there is any noticeable effect of the steel strike in the United States.

Mr. Capwell said that it is difficult to get shipments of sheets. Orders for sheets which were placed months ago have not been received by the plant. Stocks from which foundries and forging plants have been drawing are running low and in many cases are exhausted. Should the strike not be settled soon the situation will become very serious and many a shop will certainly be up against the inability to get its raw products.

The Canadian Blower and Forge plant is busy with orders and all the raw material available. The company continues to enjoy a good share of export trade. Forges, blowers and other divers lines are being turned out for New Zealand, Australia and South Africa. Orders for heaters also have been received from England. The only difficulty is the scarcity of boats.

The company has about 150 men on its pay roll, more than at any time, not including the period during which the plant was engaged on war orders.

PIG IRON TRADE

The market is steadier than has been the case lately, and the fervid demand for spot iron is easing up. Basic grades have advanced, and are strong. Following are reports from U.S. centres:—

Pittsburgh—The increased demand for steel-making iron has put basic on the same level as other grades, in regard to price. Basic, for December shipment, has been sold at $30 valley furnace, and first quarter Bessemer at $31.50 valley. Foundry iron, prompt delivery, is around $34 furnace.

Boston.—There have been good sales during the week, but mostly for first half delivery, but spot iron has receded somewhat from its high position. A quotation of $37, delivered for 2.25 to 2.75 silicon, was refused by the enquirer.

Birmingham.—There is good enquiry here, and an advance of $1 has been made. Makers are cautious about making sales, fearing a wage adjustment that will increase costs.

Buffalo.—There is a shortage of iron in this district, and Canadian furnace is finding a market here. No. 2 foundry is being bought at $34; No. 2X at $35.25; and No. 1X at $37.

Cleveland.—Furnaces are not very anxious to accept first-half business as yet. This is evidenced by the difficulty the large automobile manufacturers are having in finding makers to undertake their requirements, which are in the neighborhood of 100,000 tons of foundry and malleable. 1.75 to 2.25 silicon foundry-iron for first half has been placed at $32 furnace.

Cincinnati.—There is not much iron available here. A sale of malleable for this year's shipment has been made at $35 furnace. Spot iron is scarce, and no quotation for future iron can be obtained.

St. Louis.—The market is firm, with a tendency to become stronger. Furnace interests are going out of the market, and some good orders have been turned down. Spot iron is bringing fancy prices, and 1920 iron is not being touched.

New York.—There has been considerable 1920 business closed during the past week. About 15,000 tons has been booked by an Eastern Pennsylvania furnace for delivery in this district. High silicon iron is scarce and prices up.

Philadelphia.—The prices in the pig-iron market have receded somewhat during the week. Basic has been sold for 1920 delivery at $31 to $32, delivered. Export enquiries for 22,000 tons basic and 10,000 tons foundry are out.

U.S. SCRAP METAL

There is a strengthening of the scrap iron market all over the country, and enquiry is brisk. Following are reports from various centres in the U.S.:—

St. Louis.—The scarcity of pig iron is reflected in the strong demand for scrap, while rolling mills are also in the market. Stove plate has advanced $2 to $26.50; railroad malleable has advanced from $18 to $25 a ton. Railroad offerings are light.

Boston.—There is a good demand for all grades of scrap, though, owing to its scarcity, there is no great volume of trading. No. 1 machinery has been sold at $32.50, delivered at foundry.

New York.—There has been a general advance in prices of all grades of scrap. Heavy melting is quoted at $17 to $17.50, old steel shafting $24 to $25, machinery cast $25 to $26.

Philadelphia.—A comparatively small volume of business, coupled with a big demand, has caused an advance in all grades here. Advances vary from 50 cents to $2 per ton. There is an inclination on the part of dealers to hold stocks for higher prices.

Pittsburgh.—The market here is advancing, more in sympathy with the eastern pig iron market, than from any particularly strong demand here. Heavy melting is looked to for a sharp advance very shortly, while cast-iron borings are selling round $20. No. 1 cupola cast is $29 to $30.

Buffalo.—There is a very big enquiry for steel-making grades, as well as foundry, and all grades have advanced. The enquiry for heavy melting totals 100,000 tons.

Cleveland.—Foundries are in the market for cast scrap, the supply of which is getting scarce. Increases have taken place in many grades, and dealers are confident of higher prices in all grades. Dealers will not sell steel scrap on contract under $25.

Chicago.—There is a good demand for malleable grades, while heavy melting is comparatively quiet. Some big deals have been closed, including 50,000 tons of shells, in one lot, with two smaller lots of 25,000 tons and 10,000 tons. Malleable sold at $28 per gross ton.

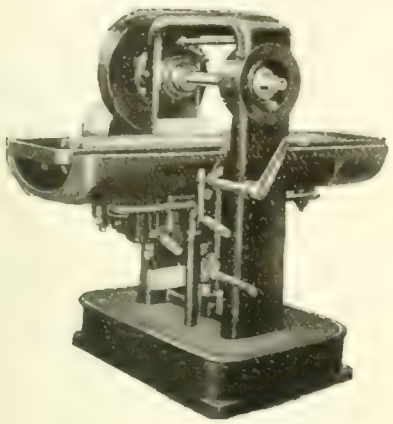
Cincinnati. — There has been no change in prices, but the tone of the market is firm. The car situation is better.

Birmingham.—The demand for cast and stove plate is very strong, with lower grades active. The market is stronger. More material will be available after the end of the year.

While there is reason for believing that no very extensive contracts have been given out yet for work in the devastated regions in France, there are occasional rumors of important undertakings being placed in the hands of foreign firms, and from a German source has come the news that reconstruction work on a very large scale, including the rebuilding of Laon, has been confided to British firms. This news has been officially denied. Not long ago it was stated that Laon was to be rebuilt by the Americans, but, while negotiations are certainly in progress, it is not likely that any very large contracts will be given out until arrangements have been completed with the Germans for the execution of the preliminary work. The chances of British and American participation are much brighter since the Government has come to the conclusion that this must be done if the Allies are to help France in its present sore need.

Speaking on Progress of Aviation in the War Period, before the Royal Aeronautical Society recently, Dr. Leonard Bairstow said that the speed of aeroplanes has increased from 85 to 135 miles per hour in five years, and some further improvements might be expected in the future. No equal addition to the speed range was probable, and economy suggested a reduction. It was not possible to decide from a single estimate of the value of speed in civil aviation, but for fighting it was the last reserve of superiority which was all important.

BRIGGS MILLERS



We Call It the Big Little Milling Machine

And so it is. A man who is unfamiliar with the "Briggs" and the work of which it is capable is always surprised at the power available and the extreme rigidity on any milling operation which is within the range of this tool. It is a small machine; but the solid over-arm construction and the convenience of operation make it a manufacturing machine of unsurpassed production possibilities on all work which it can handle.

The low first cost of the Briggs Miller is another of its surprising features. The floor space required is small. Upkeep is slight, operating cost is low because skilled labor is not required to obtain the best output of which the machine is capable. And there are other advantages, too, which we'll be glad to explain in more detail.

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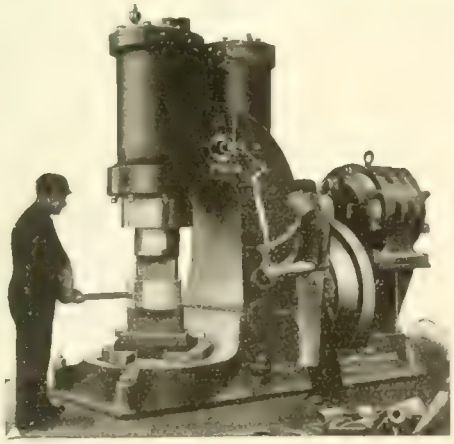
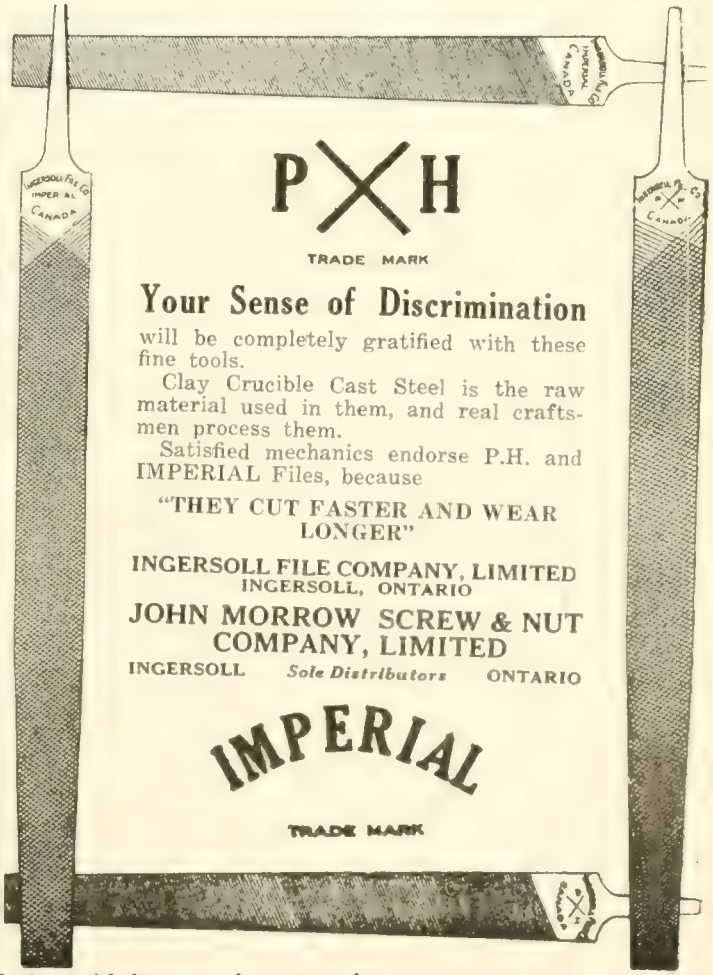


The Most Modern Reliable Power Driven Substitute for the Steam Hammer.

Built in 3 types, 6 sizes, arranged for belt or direct motor drive, with capacities up to 7" square for all manner of jobbing, manufacturing and certain classes of die forging. Write for catalogue.

Nazel Engineering & Machine Works

Dept. F., Philadelphia, Pa.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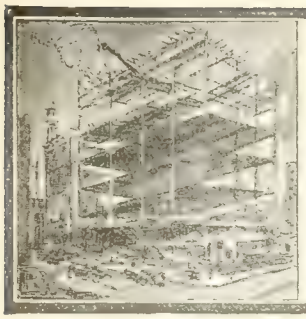

INDUSTRIAL NEWS

NEW SHOPS, TENDERS AND CONTRACTS PERSONAL AND TRADE NOTES

PERSONAL

Thos. Firth & Sons, Limited, Sheffield, Eng., announce that Mr. James A. Sherwood, who has for a number of years represented them in Canada, is retiring, and that Mr. John J. Coleman, who has had charge of the Toronto branch, has been appointed as successor to Mr. Sherwood. Mr. Coleman has just returned from Sheffield, England, where he spent the month of September.

TRADE GOSSIP

Want to Buy Furnace.—The Hammond Steel Co., Inc., Syracuse, N.Y., are in the market for a second-hand six-ton Heroult electric furnace, complete with transformers and all equipment necessary to start operations.

Belleville Gets New Mill.—The Judge Jones Milling Company, of Montreal, have transferred their plant from that city to Belleville. The firm, who are manufacturers of cornmeal, oatmeal, rolled oats, and other cereals, are building an elevator with a capacity of 45,000 bushels of grain.

Establish Branch in Woodstock.—Another United States manufacturer, this time the Hook and Eye Company, have established a Canadian branch in Woodstock. Premises have been secured and the production will soon commence of hooks and eyes, safety pins, dome fasteners, etc. This is the second new industry to come in ten days.

Canada's Trade Declines.—The seven months of the fiscal year ending October 31, show a decrease in the country's trade of $33,000,000, as compared with the same period of last year. The total trade for the seven months' period of this year amounted to $1,259,648,374, while for the seven months of 1919 the total was $1,249,493 885.

Moving Office.—The Union Carbide Co. of Canada announce that on November 29 they will conduct their sales office from Welland, where the works are located. The Toronto offices have been located heretofore in the Dominion Bank Building. The firm's reason for taking this step is that they believe they can secure better results by having the sales office and factory together.

New Factory for Willards.—What is claimed to be the largest ice cream factory in the world, will be erected at Dupont Street and Manning Avenue, Toronto, by Willard's Chocolates, Ltd. They will ship ice cream by carloads, daily, to Montreal, Hamilton, etc., in the summer. The ice consumed will amount to 200 tons daily, and a carload of salt per day will be used.

Appoint Separate Boards.—In connection with the disputes in the Sydney coal mining fields, the Department of Labor has agreed to appoint separate conciliation boards for each colliery. The miners wish to have one board to cover all. However, they will appoint the same representative to all the boards, their choice being J. C. Watters of the Trades and Labor Congress.

Gillies Bros.' New Mill.—The new mill which Gillies Bros., of Braeside, are building to replace their lumber mill recently destroyed, is of concrete construction. This is a new departure in sawmill construction in Ontario. The new mill will be 190 feet by 73 feet, facing the Ottawa River. All the machinery wil be electrically driven. A. F. Byers & Co., Montreal, are the builders.

Pumps Have Short Life.—The Board of Control of Toronto were informed by Works Commissioner Harris that the four electrically-driven pumps installed in John Street pumping station in 1911, are in need of renewal. One is at present out of commission, and three others are in such condition that further repairs are not worth making. Provision has been made in the estimates for $75,000 for new pumps.

Making Tractors. — Manufacture of tractors is being commenced in the Cluff Bros. ammunition plant on Atlantic Ave., Toronto. The interests of the Chase Motor Truck Company of Syracuse, N.Y., were purchased recently by the Cluff organization, and the plant headquarters have been moved to Toronto. It is proposed to make a large number of tractors for the season of 1920. The company does not intend to make cheap tractors, but has announced its intention to concentrate on a high-grade machine. After study of the tractor situation they determined that there is need for better tractors rather than for cheaper tractors.

Going to Galt.—It was announced by the Board of Trade that another new industry has been secured for Galt—McCaskey Systems, Ltd., of Carlaw Ave., Toronto, a branch of an American concern of Alliance, Ohio. A special committee of the board has been negotiating with the firm for some time, and a deal has just been closed whereby the concern purchases the modern manufacturing plant of the Roelofson Machine Tool Company on Beverley Street. This industry, which manufactures counter checkbooks, credit registers, and professional systems, will locate there next summer, and will employ about 100 hands, 50 of whom will come from Toronto. The firm has outgrown its Toronto quarters.

Sydney Mines, N.S.—Asked to confirm the report that industrial conditions showed indication of improvement at the Steel Plant a Scotia official spoke optimistically and felt confident that within a short time there would be a change for the better, although he was not in a position to say when business would get back to normal. A considerable quantity of pig iron arrived from the car works, New Glasgow, during the past few weeks, sufficient to keep two open hearth furnaces in operation for a period. There is only a working force of three hundred men employed in the plant. With the blast furnace again going full steam ahead, this force will necessarily be increased, and everybody employed. The steel workers are hopeful that trade conditions will soon be restored to normal.

MARINE

Port Colborne.—During the recent storm about 100 feet of the superstructure of the eastern pier at Port Dalhousie sank. This has left considerable debris, and vessels entering the port are warned to keep as far as possible to the west of the east pier.

Nobel Plant is Sold.—The British Cordite Munitions plant at Nobel, near Parry Sound, has been sold to Mr. I. Cohen, a well-known merchant of Kingston. Nothing is known of what Mr. Cohen's intentions are with regard to the property, which includes buildings, machinery, trackage, etc.

Van Horne Property Sold.—The Realty Service Company have sold the property on the north side of Van Horne Street, west of Dovercourt Road, to Soren Bros., tinware manufacturers, who will erect a new factory there. The property contained 332 feet, and the

price obtained was in the neighborhood of $50,000.

St. John, N.B.—Sir Frederick Lewis, chairman of the Furness, Withy Company, has been looking over the harbor of St. John, and is of the opinion that better facilities are needed. One of the most important requirements was the extension of the breakwater from West St. John to Partridge Island, in order to protect existing and contemplated facilities.

Sault Ste. Marie. — The wooden steamer Myron foundered a mile and a half off White Fish Point, Lake Superior, and her crew of eighteen men with the exception of the captain, who was picked up after floating on top of the pilot house for 20 hours, are feared lost. Several attempts were made by passing steamers to rescue the men, who were in boats and on rafts, but, although lines were thrown to them, they were unable to hang on. The weather conditions were such that the would-be rescuers had to leave the men to their fate.

New York.—The steamer Imperator has been handed over to the British Minister of Shipping by the U.S. Shipping Board. The Imperator will sail for England shortly, and will be used in the Cunard Line service.

Bridgeburg Gets New Plant.—The Reliance Manufacturing Company, with a capital of $500,000, will locate in Bridgeburg. The factory will be on Lewis Street, and the product will be electrical goods, such as fuses, switches, etc. The Brazil Motors Company, of Brazil, Ind., which is considering Welland, Port Colborne or Bridgeburg as sites for a factory, has arrived at no decision yet.

Railway Board Decides Dunnage.—The amount of dunnage that will be allowed on agricultural machinery, implements, stoves, street cars, vehicles, etc., shipped in box or stock cars, has been fixed at 650 pounds by a judgment of the Board of Railway Commissioners. The allowance was formerly 1,000 pounds, and this has now been cancelled.

No Coal From Ontario.—The Fuel Commissioner has issued an order prohibiting the shipping of any bituminous coal from Ontario without a permit from him. This order is to insure the supply of bituminous coal for Ontario needs as the commissioner feared that attempts might be made to ship some of the coal stored here to points outside the province.

Collingwood. — The steamer M. J. Nessen, of Chicago, was seized by the Chief of Police, acting under instruction from Messrs. Burke, of Midland. The vessel is under repair in the yard of the Collingwood Shipbuilding Company, and the seizure is on account of expenses incurred in raising the vessel when sunk at Meaford. The captain of the vessel claims that the charges are excessive, and will give bonds to cover the amount. He will fight the matter in the courts.

Sault Ste Marie.—Tugs searching the lake for traces of the John Owen returned with wreckage bearing the name of "John Owen." This destroys all hope of the steamer not having been lost. Hatches and other movable fittings have been found, but no traces of a lifeboat or life preserver. There is little chance of any of the crew having survived.

TENDERS

The Department of Public Works, Ottawa, are asking for tenders for the reconstruction of the wharf at Owen Sound. Tenders will be received up till noon Friday, December 12. Plans and forms of contract can be seen at the office of the District Engineer, Equity Building, Toronto, and at the Post Office, Owen Sound.

CATALOGUES

Black & Decker, Baltimore, have issued a new catalogue on portable electric tools, electric air compressors and special machinery. The catalogue is an excellent specimen of good typography and presswork. Besides the above-mentioned lines are drills, tapers, sleeves, etc. Black and Decker products are covered by the usual guarantee. The firm warns against having repairs made by unauthorized parties. The catalogue is being issued twice a year by this firm.

BOOK REVIEWS

The University of Illinois Engineering Experiment Station has issued bulletin No. 110 on "Passenger Train Resistance." The department of railway engineering of this university has, for some years, carried on experiments to determine the tractive resistance of steam railway trains and electric railway motor cars. The result relating to steam railways thus far furnished have applied only to freight trains; this bulletin presents for the first time result of experiments with passenger trains. These experiments were begun in 1908 on local trains and were resumed during the spring and summer of 1915 on through passenger service. The results presented in the bulletin define the resistance of trains that move throughout the ordinary range of speed of passenger trains. It is also made clear that in passenger, as in freight trains, the resistance expressed in pounds per ton varies with the average weight of the cars composing the train and works the same for trains made up of heavy cars as of trains made up of light cars.

The University of Illinois Engineering Experiment Station has issued bulletin No. 109 on "The Orifice as a means of measuring the flow of water through a pipe." In this bulletin are given the results of tests made to determine the practicability of measuring the flow of water by means of the thin-plate circular orifice inserted in the pipe, to determine the experimental co-efficients for calculating the velocity of the flow in the pipe and the discharge and to determine the conditions most favorable to the use of such an orifice as a flow measuring device. The theory of the orifice is first developed and tests and results are given in exhaustive form. Further subject matter has to do with the effect of deviation from standard position and the general applicability of the pipe orifice method is thoroughly discussed in the summary. It would seem that this device might well be used, for example, in testing the efficiency of certain forms of pumps in measuring the performance of individual wells of water works systems, in determining the water power for individual purposes in mills and factories, in measuring the discharge through city main and in distributing water for irrigation purposes.

"The Manufacture of Chemicals by Electrolysis," by Arthur J. Hale, B.Sc., F.I.C. Price 6 shillings. Eighty pages. Constable & Co., London.

The manufacture of chemicals by electrolysis is of sufficient importance to justify the appearance of a monograph on the subject. Accordingly the author has given a complete and up-to-date account of processes now in use, and an indication has been given of future developments.

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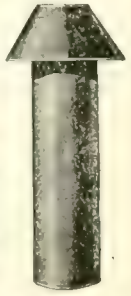

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SEND US YOUR ENQUIRIES.

Upon the Health of your employees depend your profit and production

Don't be contented with half-way goodness or makeshift drinking arrangements.

Throw out the germ-laden Drinking Cup!

Give your men a clean drink

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SANITARY DRINKING FOUNTAIN

Allows just the proper amount of cool, clean fresh water to come through the bubbler. No spurting, overflowing, no loss. "Puro" regulates itself. "Puro" saves 55% on water bills, too. You can attach it in a few minutes.
Tell us how many men, how many departments and we'll tell you how much the cost will be.

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For those interested in the preparation of the substances outlined in the abstract given below, this publication should be of service. An excellent index, both name and subject, together with copious references, materially adds to its value.

Contents

Chapter I: Electrolytic hydrogen, oxygen and ozone; Chapter II: The production of per-salts and hydrogen peroxide (per sulphates and persulphuric acid, hydrogen peroxide, per carbonates, potassium permanganates, potassium ferricyanide, electrolytic sulphuric acid); Chapter III: Nitric acid, hydroxylamine, hydrosulphates, fluorine; Chapter IV: Electrolytic preparation of pigments and insoluble substances (precipitation of metallic oxides, lead chromate, lead sulphate, lead peroxide, white lead, zinc white, the separation of the rare earth oxides, pyrophoric alloys, tungsten bronzes; Chapter V: Electro-osmosic and electro-colloidal processes (dehydration, glue, tanning, silicic acid, alumina, lixivation, principles); Chapter VI: Electrolytic production of organic compounds; Chapter VII: Oxidation and substitution of organic compounds.

WILLIAM ADMITTED IT

"I understand old man Simpkins was very much opposed to his daughter marrying Bill Smith; called Bill a fool and all that sort of thing."

"That's true, and before he had been married six months Bill admitted the old man was right."

Special Machinery
MADE TO ORDER

Mill Machinery, Engine Work
Grey Iron and Brass Castings

TRY US FOR GENERAL REPAIRS

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Electric Travelling Cranes, Hand Cranes, Electric Hoists, Air Hoists, Foundry Equipment, Cupolas, Ladles, etc., etc.

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when advertising that as many prospective buyers as possible read what you are selling. We advise you to use **Canadian Machinery.**

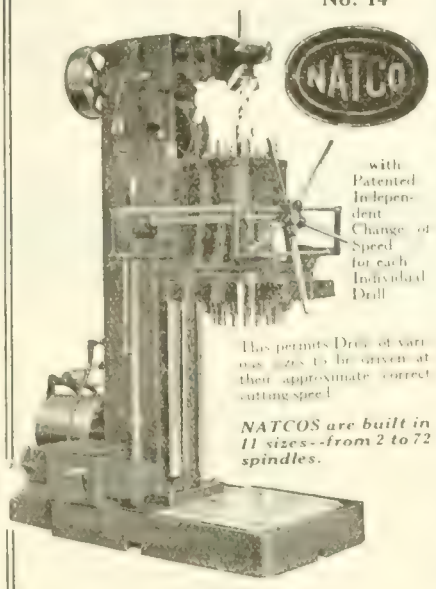
KEEPING SMOKESTACKS IN CONDITION

Owners of factories are usually interested in preventing the depreciation of their plant buildings and equipment by frequent painting, but they oftentimes are prone to forget to take corresponding precautions to insure the long life of their smokestacks. When rust put a smokestack out of business it means putting up a new one and possibly the tie-up of the entire plant. Therefore, this important link in the equipment should be kept in good condition by paint ing about once every two years.

There is on the market a special smokestack paint, which, drying to an enamel-like surface, prevents the metal from the stack from corroding as a result of exposure to moisture in the air and to gases in the smoke. It is also proof against the high temperatures to which stacks are subjected, and may, if necessary, be applied when the stacks are hot. It is to the advantage of every mill owner to use this paint frequently to double the life of the smokestacks in his plant.—Compressed Air.

Pig iron continues to advance. The valley market now stands as follows: Bessemer, $31.50; basic, $30; malleable, $32 to $33; foundry, $33 to $34, f.o.b. valley furnaces.

No. 14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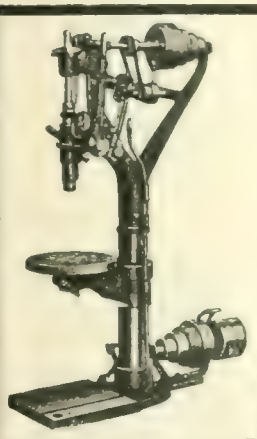

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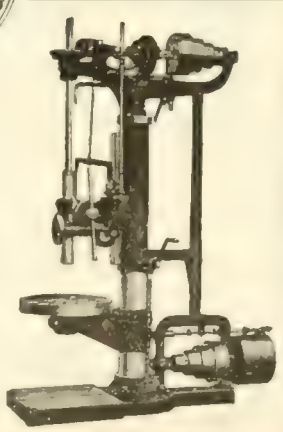

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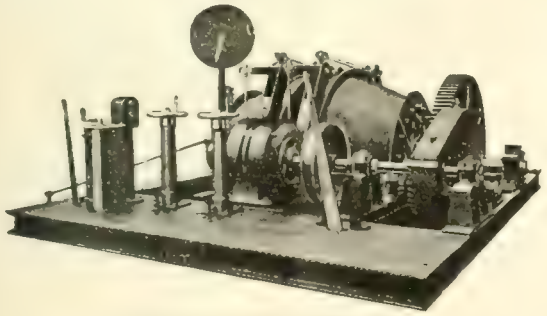

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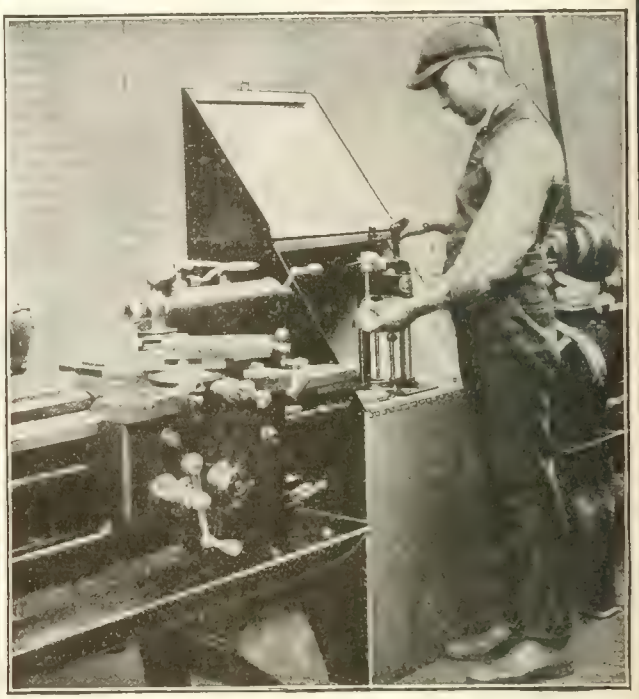

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Every Mother Who Lost a Son at the Front

will read with deepest feeling Nellie McClung's wonderful story, "Men and Money," which also appears in November MACLEAN'S. Mrs. McClung wrote this story with a purpose—to show the ease with which the world forgets the contribution these mothers made. But it is also a very fine story—real, human and gripping.

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The November MACLEAN'S is cram full of other big features—famous writers on vital subjects and everything Canadian. Look over this list:

Baroness Orczy.—The author of "The Scarlet Pimpernel," best seller of best sellers, is represented by a serial story, "His Majesty's Well Beloved."

Robert W. Service.—The great poet of the Yukon and the battlefront contributes a strong poem, "The Outlaw."

Basil King.—This great novelist who lives abroad contributes an interesting discussion on "Why I Remain a Canadian."

Janey Canuck.—An article on Mrs. Murphy's experiences as the first woman magistrate in the whole of Canada.

Camilla Kenyon.—A new novelist who promises to become a great favorite, tells a humorous story of adventure, and treasure, "Spanish Doubloons."

Stephen Leacock.—A humorous sketch entitled, "My Memories and Miseries as a School Master."

"Two Men and an Idea That Grew and Grew and Grew."—By Charles Christopher Jenkins.—A sketch of two remarkable and practically unknown Western Millionaires.

"A Little Bit of Chicken Feed."—By Allen C. Shore. A bright story combining love and business themes.

"The Rainbow Death,"—By Madge Macbeth. An intensely interesting detective story.

"The Search for Missing Men."—By Gertrude Arnold. An article on hospital experiences at the front by a young Canadian V.A.D.

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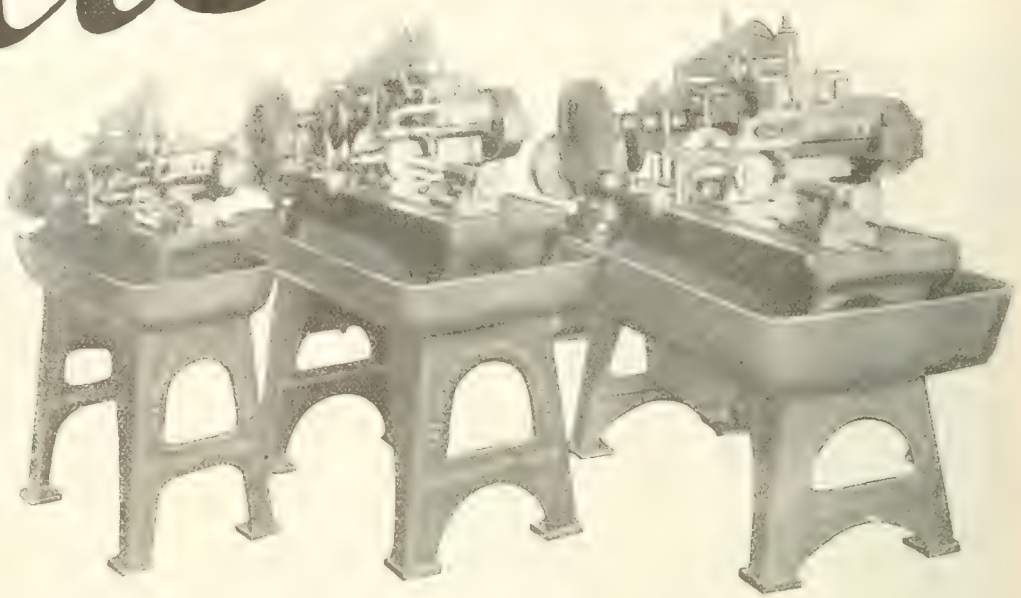

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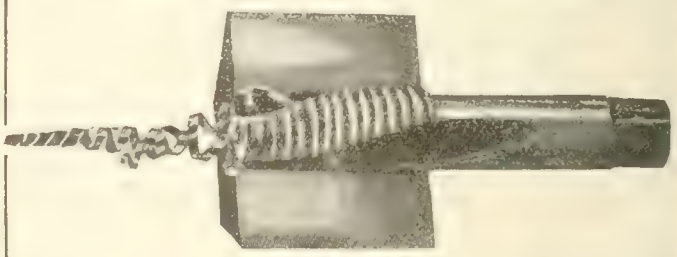

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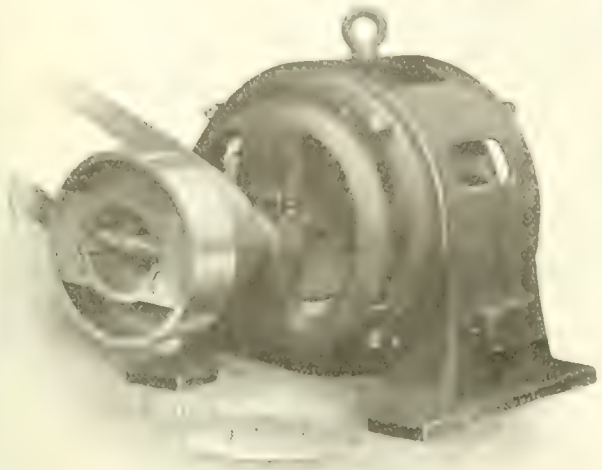
½ H.P. to 1500 H.P.



No Motor Should be Without This Simple and Unique Device.

Entirely Dispenses With all Starting Difficulties

The Clutch also Effects a Great Saving in Current Consumption and Reduces the Initial Cost of Motor and Switchgear.

Please Mention Speed and H.P. of Motor When Sending Enquiries and State the Current Supply.

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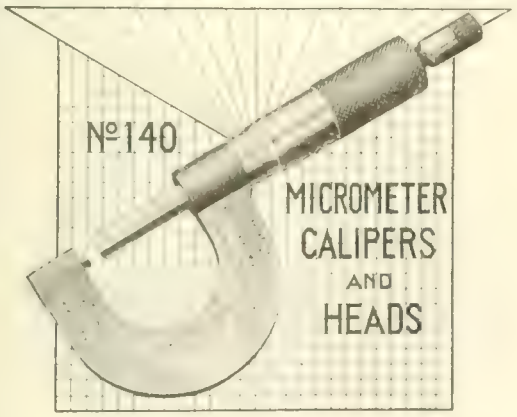
Thomas Broadbent & Sons, Limited

HUDDERSFIELD, ENGLAND

ALMOND



All Almond Micrometers are inspected and adjusted to Johansson Gages and recognized comparison only with these gages.

Almond Service.—Should the Micrometer need readjusting at any time or defect in material or workmanship develop send to Ashburnham and readjustment or replacement will be made without expense.

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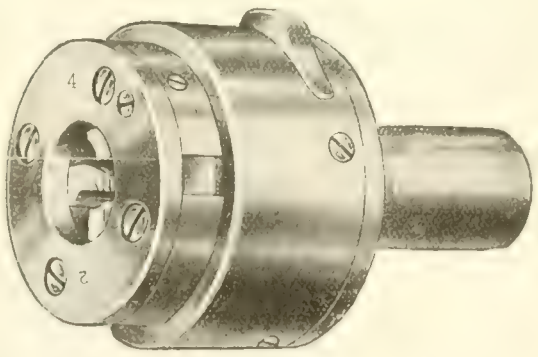
DRILL CHUCKS, RIGHT ANGLE TRANSMISSION LATHE CHUCKS, FLEXIBLE STEEL TUBING

T. R. Almond Mfg. Co., Ashburnham, Mass.



H & G Die Heads

are of small outside diameter compared with the size of work they do.

The H. & G. illustrated is an automatic, self-opening Die Head designed especially for use on Gridley and National Acme Multiple Spindle Screw Machines and others that use the die in a revolving position. The four sizes of this Head cut up to 9/16", 1", 1¼" and 1½".

All parts are hardened and ground and interchangeable. In a word—it's an H. & G.

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Eastern Machine Screw Corp.

New Haven, Conn., U.S.A.

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STRUCTURAL STEEL WORK

Machine work of all descriptions. Send us your specifications.

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with Condensing Plant for quick delivery from stock at very favorable price.

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Engineering and Mill Supplies, Tools, etc.
Let us list your second-hand machinery or quote you on same.
We are also open for proposition to carry some good lines.

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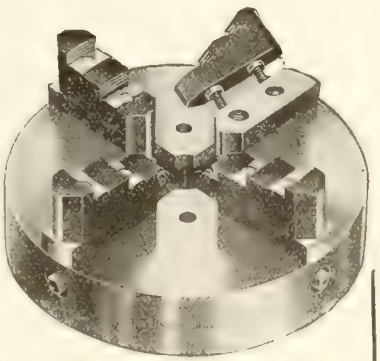

Over 30 years of satisfactory service have placed these chucks where they belong—

On many of America's best machine tools—

In many of the better metal working plants of the world—

In the highest esteem of thousands of operators.

If you use chucks, investigate the Skinner line. It will pay you.

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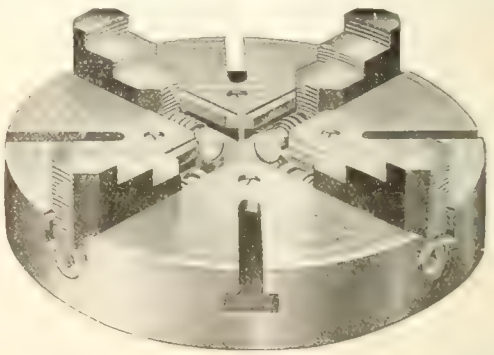

THE UNION STEEL BODY CHUCKS

are well designed and have all the elements of strength and durability for which they are designed. We make other types in steel also, including the Geared Scroll Chucks and the Geared Scroll Combination—all designed for heavy work and hard usage.

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New York Office: 26 Cortlandt Street

Makers of a complete line of chucks

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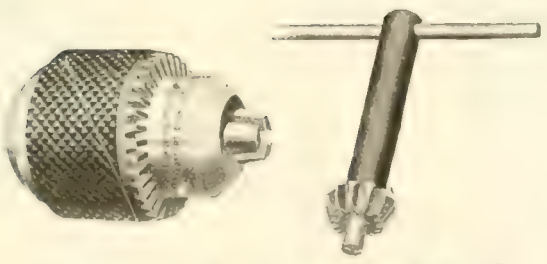

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Hartford ~ Connecticut.

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"BOTH in these operations and half another — I'll show you later — completed in the time our old taps took to do one; that, I guess, is why we continue to use your Victor Collapsible Taps."

It was the often-heard story of time saved, of costs lowered, of all threads clean and smooth. And it was pleasant to hear.

Victor Tool Company
Waynesboro, Pa.
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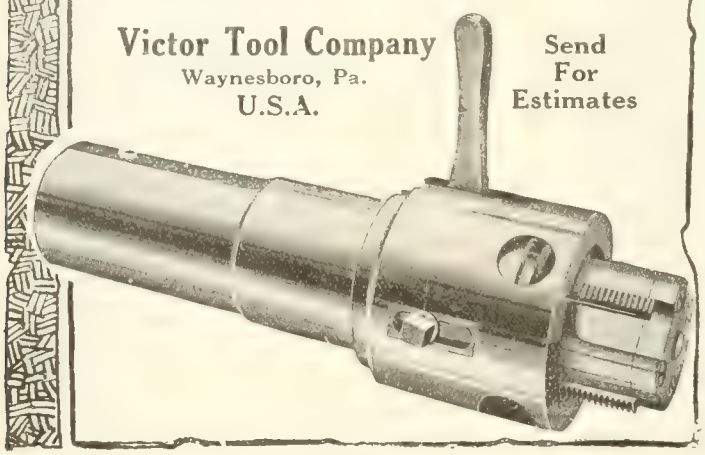
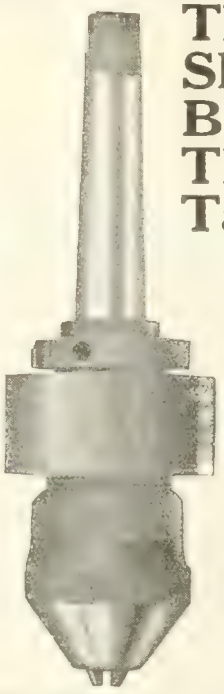


The Saving Slip of the Bicknell-Thomas Tap Chuck



is its most important feature. Powerful enough to drive the tap under all ordinary conditions, the friction slips before enough strain can develop to break it. Compact — invaluable on multiple spindle machines. Adaptable — ideal for tapping blind holes.

Made in four sizes — from ⅛ to 1 inch taps. Straight or Morse taper shanks.

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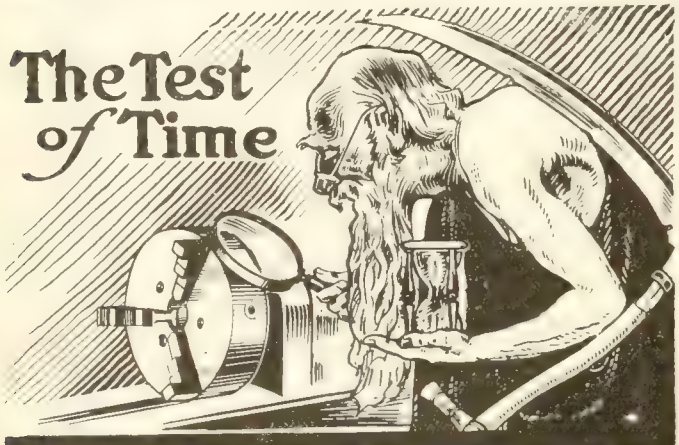

"CUSHMAN" CHUCKS 1862

LATHE CHUCKS DRILL CHUCKS FACE PLATE JAWS

Three Generations of Skilled Mechanics have made them and have used them

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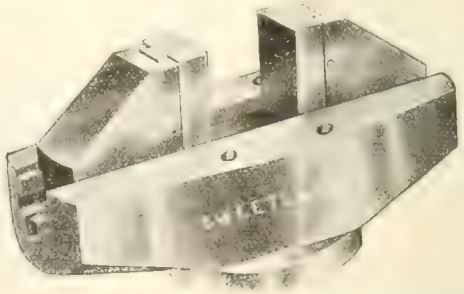
The Sweetland Box Body Chuck with soft steel Slip Jaws, Tool Steel and soft Metal Slips, or Special Jaws of any kind can be furnished when required.



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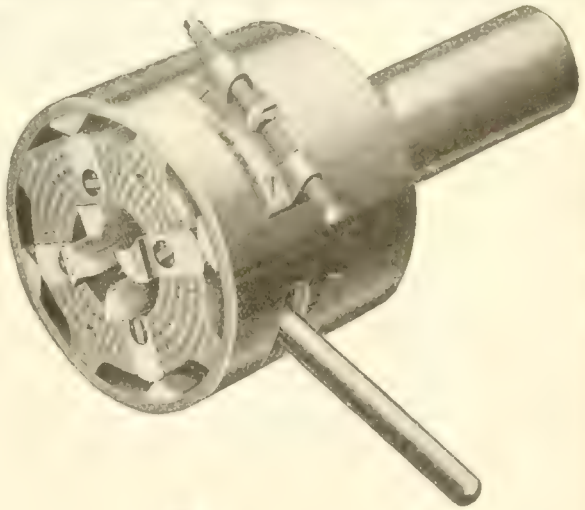
"NAMCO DIES TAPS



It doesn't make a bit of difference whether it's threading screws or tapping axle housings, there's a NAMCO Threading Tool for every thread cutting requirement.

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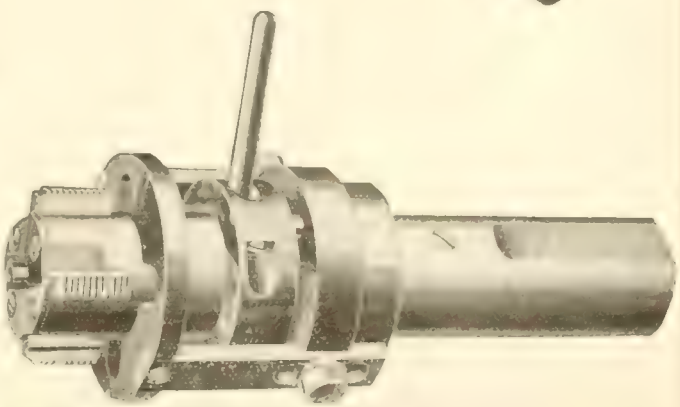

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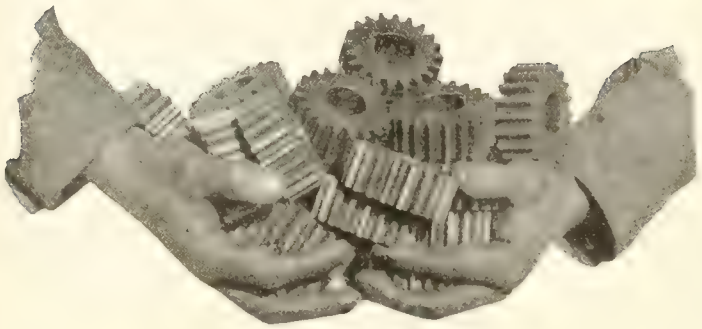

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There's a Famous Five File for Every Kind of Work

And every one is made of high grade steel, and ground and cut for its particular purpose.

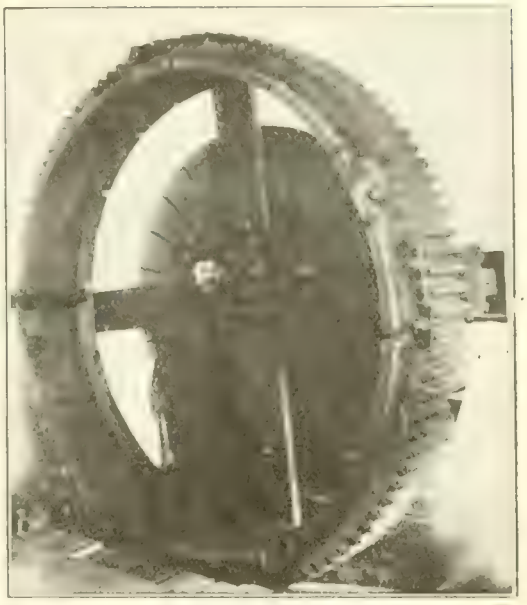
Give your men Famous Five Files to work with, and you will get good results.

Also teach them to turn in a file as soon as it becomes dull.

You do not need to be afraid to do this with Famous Five Files, because they will not grow dull quickly.

Specify them when ordering.

They are:



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THE "HISCO" plant is equipped to produce machine-moulded gears up to 18 feet in diameter without patterns—and remember, very often the pattern costs more than the gears.

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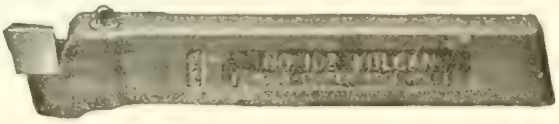

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are compensated to eliminate errors due to cold and temperature changes of the thermo-couples.
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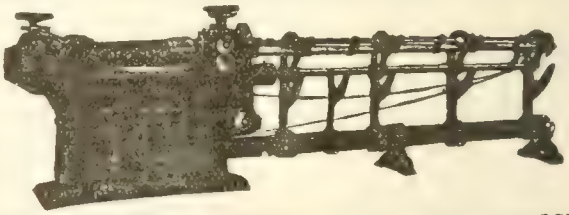
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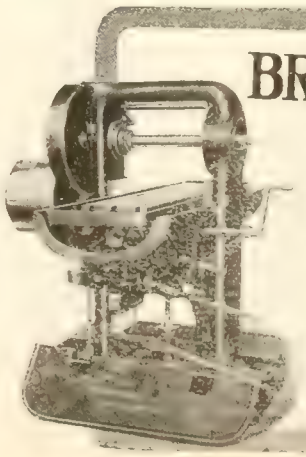
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This Miller is a working production re[illegible] It handles [illegible] its size can [illegible] and it does perfectly accurate [illegible] Rigid, powerful, accurate.
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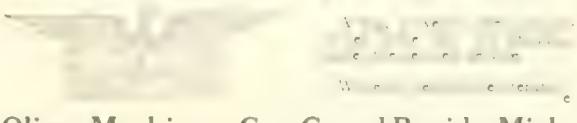

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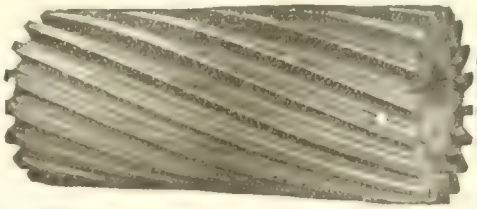

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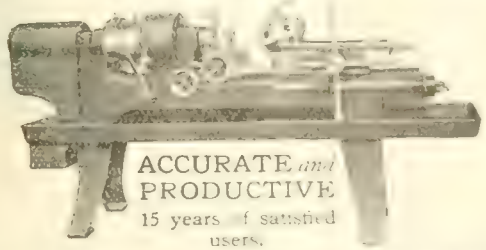

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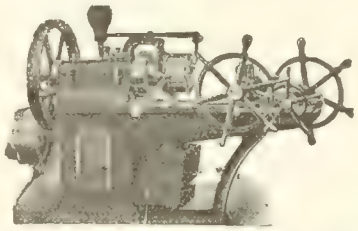

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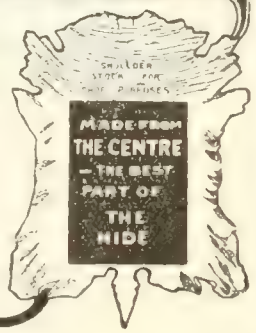

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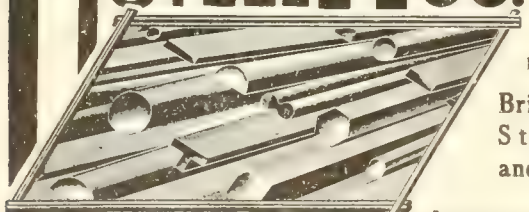

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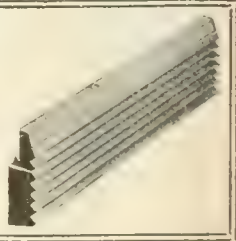

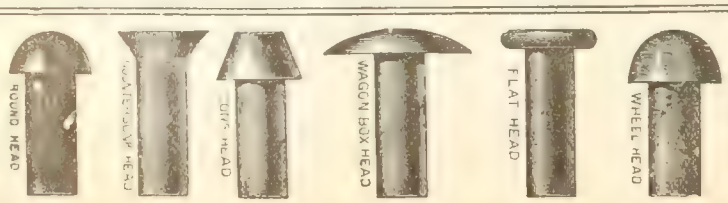

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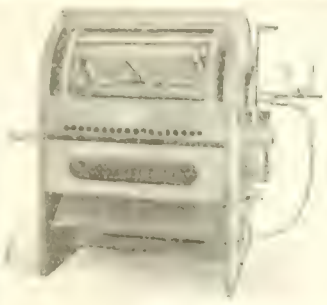

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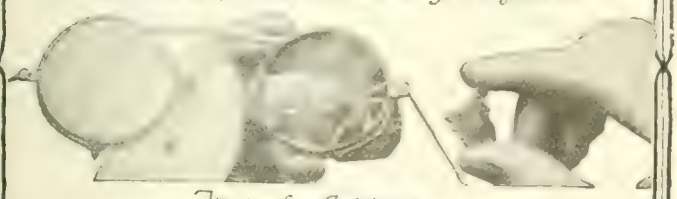

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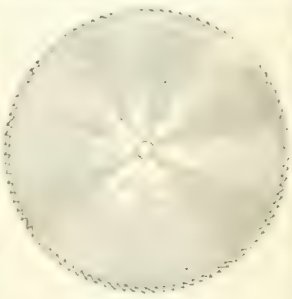

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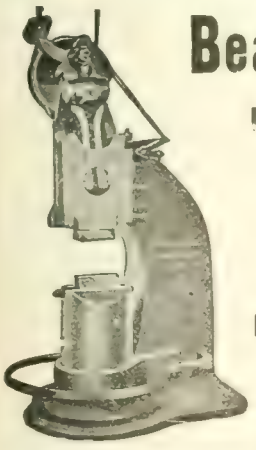

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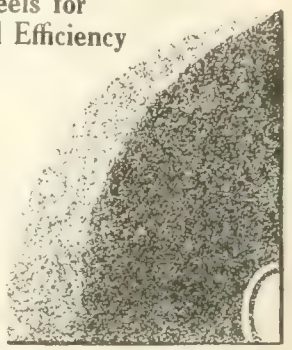

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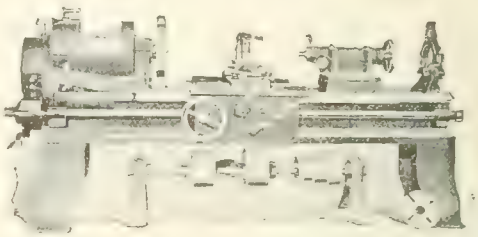

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Swedish Crucible Steel Co. Windsor.

CARRIERS, PNEUMATIC TUBE
Jones & Glassco, Montreal

CARS, INDUSTRIAL
Can. Blower & Forge Co., Kitchener, Ont
Can. Fairbanks-Morse Co., Ltd, Montreal
Elec. Steel & Metals, Welland, Ont.
MacKinnon Steel Co., Sherbrooke, Que.
Morris Crane & Hoist Co., Ltd., Herbert, Niagara Falls, Ont.

CASTINGS, MACHINERY
Wilson & Co., J. C., Belleville, Ont.

CASTINGS, ALUMINUM, BRASS BRONZE, COPPER, AND GUN METAL
Algoma Steel Corp., Sault Ste. Marie.
Brockville Foundry Co., Brockville, Ont.
Franklin Mfg. Co., Syracuse, N.Y.
Canada Metal Co., Ltd., Toronto, Ont.

CASTINGS, DIE CAST
Canada Metal Co., Ltd., Toronto, Ont.
Franklin Mfg. Co., Syracuse, N.Y.

CASTINGS, STEEL—ALL KINDS
Electric Steel & Metals Co., Welland.
Mesta Machine Co., Pittsburgh, Pa.

CARRIERS COUPLING BOLTS
John Morrow Screw & Nut Co., Ingersoll
Alexander Fleck, Ltd., Ottawa.
Greenleafs Ltd., Belleville, Ont.
St. Lawrence Welding Co., Montreal.
Tallman Brass & Metal Co., Hamilton.

CASTINGS, BENCH LEG.
Brown & Sharpe Mfg. Co., Providence, R.I.

CASTINGS, BRASS AND IRON
Algoma Steel Corp., Sault Ste. Marie
International Machinery and Supply Co., Ltd., Montreal, Que.

CASTINGS, BUILDING
Katie Foundry, Galt, Ont.

CASTINGS, GRAY IRON
Bernard Industrial Co., A., Fortierville, Q
Brown & Sharpe Mfg. Co., Providence, R.I.
Brown Boggs Co., Ltd., Hamilton.
Alexander Fleck, Ltd., Ottawa.
Gardner & Son, Robt., Montreal.
Greenleafs, Ltd., Belleville, Ont.
Hull Iron & Steel Foundries, Ltd., Hull
International Malleable Iron Co., Guelph
Kennedy & Sons, Ltd., Wm., Owen Sound.
Katie Foundry, Ltd., Galt, Ont.
Hamilton Co., Wm., Peterboro.
Wilson & Co., J. C., Belleville, Ont.

CASTINGS, PLUMBERS'
Katie Foundry, Galt, Ont.

CASTINGS, NICHROME
Can. Driver Harris Co., Ltd., Walkerville

CASTINGS, HARDWARE
Katie Foundry, Galt, Ont.

CASTINGS, STEEL CHROME AND MANGANESE STEEL
Thos. Davidson Mfg. Co., Montreal, Que.
Dom. Foundries & Steel, Hamilton, Ont.
Hull Iron & Steel Foundries, Ltd., Hull.
Kennedy & Sons, Ltd., Owen Sound.

CASTINGS, MALLEABLE
International Malleable Iron Co., Guelph

CASTINGS, NICKEL STEEL
Hull Iron & Steel Foundries, Ltd., Hull.

CEMENT, IRON
Warmington & Co., J. N., Montreal, P.Q.

CEMENT, ELASTIC JOINTING
Warmington & Co., J. N., Montreal, P.Q.

CEMENT MACHINERY
Can. Fairbanks-Morse Co., Ltd., Montreal.
Gardner, Robt., & Son, Montreal.

CEMENT HANDLING MACHINERY
Can. Link-Belt Co., Toronto, Ont.

CENTERING MACHINES
Victoria Foundry Co., Ottawa, Ont.

CENTRE REAMERS
Bertram & Sons Co., John, Dundas
Butterfield & Co., Inc., Rock Island, Que.
Gardner, Robt. & Son, Montreal
Hurlburt, Rogers Mch. Co., South Sudbury, Mass.
Morrow Screw & Nut Co., J., Ingersoll, Ont
Niles-Bement-Pond Co., New York
Pratt & Whitney Co., Dundas, Ont.
Wells Bros. Co. of Canada, Galt, Ont.
Whitman & Barnes Mfg. Co., Akron, O.

CHAIN, WELDED COIL
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.

CHAIN BLOCKS
Aikenhead Hardware Co., Toronto, Ont.
Can. Fairbanks-Morse Co., Ltd., Montreal
Ford Chain Block & Mfg. Co., Phila., Pa.
Garlock-Walker Machy. Co., Toronto.
Morris Crane & HoistCo., Herbert, Niagara Falls, Ont.
Rice Lewis & Son, Toronto, Ont.
Williams & Wilson, Ltd., Montreal, Que.
Jones & Glassco, Montreal, Que.

CHAINS, AGRICULTURAL
Morse Chain Co., Ithaca, New York.

CHAINS, AUTOMOBILE ENGINE
Morse Chain Co., Ithaca, New York.

CHAINS, BICYCLE, DRIVE AND BLOCK
Morse Chain Co., Ithaca, New York.

CHAINS, FOR ELEVATORS AND CONVEYORS
Can. Link-Belt Co., Toronto, Ont.
Morse Chain Co., Ithaca, N.Y.
Williams & Wilson, Ltd., Montreal, Que.

CHAIN, MALLEABLE, DETACHABLE AND RIVETED
Can. Link-Belt Co., Toronto, Ont.
Morse Chain Co., Ithaca, N.Y.
Williams & Wilson Ltd., Montreal, Que.

CHAINS, POWER TRANSMISSION
Morse Chain Co., Ithaca, N.Y.

CHAINS, SPROCKET WHEEL
Morse Chain Co., Ithaca, N.Y.

CHAIN DRIVES
Can. Link-Belt Co., Toronto, Ont.
Coventry Chain Co., Coventry, England.
Jones & Glassco, Montreal, Que.
Morse Chain Co., Ithaca, N.Y.

CHASERS
National Acme Co., Cleveland, Ohio.
Taylor, J. A. M., 318 Stair Bldg., Toronto, Ont.

CHEMISTS
Toronto Testing Lab'tory, Ltd., Toronto

CHISELS
Whitman & Barnes Co., St. Catharines.

CHUCKS, AERO, AUTOMATIC
Garvin Machine Co., New York.

CHUCKS, CENTERING
Hoggson & Pettis Mfg. Co., New Haven, Conn.

CHUCKS, COLLET, AIR
Elliott & Whitehall Mach. & Tool Co. Galt, Ont
Smalley-General Co., Inc., Bay City, Mich.
Williams & Wilson, Ltd., Montreal, Que.

CHUCKS, DRILL, LATHE AND UNIVERSAL
Aikenhead Hardware Co., Toronto, Ont.
Almond Mfg. Co., Ashburnham, Mass.
Bicknell-Thomas Co., Greenfield, Mass.
Bertram & Sons Co., John, Dundas.
Can. Blower & Forge Co., Kitchener, Ont.
Can. Fairbanks-Morse Co., Ltd., Montreal
Cushman Chuck Co., Hartford, Conn.
Foss Mchy. & S'ply Co., G. F., Montreal.
Gardner, Robt., & Son, Montreal.
Garlock-Walker Mach'y Co., Toronto.
Gisholt Machine Co., Madison, Wis.
Hardinge Bros., Chicago, Ill.
Hoggson & Pettis Mfg. Co., New Haven, Conn.
Jacobs Mfg. Co., Hartford, Conn.
Modern Tool Co., Erie, Pa.
Rice Lewis & Son, Toronto, Ont.
Skinner Chuck Co., New Britain, Conn.
Whiton Machine Co., D. E., New London, Conn.
Williams & Wilson, Ltd., Montreal, Que

CHUCKS, DRILL, AUTOMATIC AND KEYLESS
Aikenhead Hardware Co., Toronto, Ont
Bicknell-Thomas Co., Greenfield, Mass.
Can. Blower & Forge Co., Kitchener.
Whitney Mfg. Co., Hartford, Conn

CHUCKS, FRICTION AND TAP
Bicknell-Thomas Co., Greenfield, Mass.
Victor Tool Co., Waynesboro, Pa.

CHUCKS, MACHINE MILLING
Hoggson & Pettis Mfg. Co., New Haven, Conn.

CHUCKS, MAGNETIC
Heald Machine Co., Worcester, Mass
Williams & Wilson, Ltd., Montreal, Que

CHUCKS, RING WHEEL
Ford-Smith Mach. Co., Hamilton, Ont.
Gardner Machine Co., Beloit, Wis.

CHUCKS, WHEEL, CAR
Hoggson & Pettis Mfg. Co., New Haven, Conn.

CHUCKING MACHINES
Brown & Sharpe Mfg. Co., Providence, R.I.
Garvin Machine Co., New York
Gisholt Machine Co., Madison, Wis.
National Acme Co., Windsor, Vt.
Niles-Bement-Pond Co., New York.
Rockefeson Machine & Tool Co., Toronto.
Warner & Swasey Co., Cleveland, O.
Wood Turret Mach. Co., Brazil, Ind.
Williams & Wilson, Ltd., Montreal, Que

CIRCULATING SYSTEMS FOR LUBRICATING OIL
Bowser Co., Ltd., S. F., Toronto, Ont.
Williams & Co., J. H., Brooklyn, N.Y.

CLAMPS, BELT
Hoggson & Pettis Mfg. Co., New Haven, Conn.

CLEANERS, METER, WASTE, GENERAL
Oakley Chemical Co., New York, N.Y.

CLEANING COMPOUND
Oakley Chemical Co., New York

CLOCK SPRINGS
The Dunbar Brothers Co., Bristol, Conn.

CLOCKS, WATCHMAN, PORTABLE
Gisholt Machine Co., Madison, Wis.
Hardinge Bros., Inc., Chicago, Ill

CLUTCHES, CHAIN
Wright Mfg. Co., Lisbon, Ohio.

CLUTCHES, FRICTION AND PULLEY
Bernard Industrial Co., A., Fortierville, Q.
Can. Link-Belt Co., Toronto, Ont.
Carlyle Johnson Mach. Co., Manchester, Conn.
Positive Clutch & Pulley Wks., Akron, O.
Jones & Glassco, Montreal, Que
Williams & Wilson, Ltd., Montreal, Que.

COAL HANDLING MACHINERY
Can. Link-Belt Co., Toronto, Ont.
Dominion Bridge Co., Montreal, Que.
MacGovern & Co., Montreal, Que.
MacKinnon Steel Co., Sherbrooke, Que.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Walkerville, Ont.
Williams & Wilson, Limited, Montreal.
Nova Scotia Steel & Coal Co., New Glasgow, N.S.

COLD ROLLED STRIP, ALL METAL
COLLARS, SHAFTING
Can. Driver-Harris Co., Ltd., Walkerville.
Wilson & Co., J. C., Belleville, Ont.
Williams & Co., J. H., Brooklyn, N.Y.
Williams & Wilson, Ltd., Montreal, Que.

COLLECTORS, PNEUMATIC
Can. Blower & Forge Co., Kitchener.
J. C. Wilson & Co., Belleville, Ont.

COLLETS
Becker Milling Machine Co., Boston.
Hardinge Bros., Inc., Chicago, Ill.
Wilson & Co., J. C. Belleville, Ont.

COMPOSITION INGOT
Brown's Copper & Brass Rolling Mills, New Toronto.
Canada Metal Co., Toronto, Ont.

COMPOUNDS, CUTTING AND GRINDING, DRAWING, STAMPING
Oakley Chemical Co., New York, N.Y.

COMBINED OPEN SIDE PLANER-SHAPER
Lynd-Farquhar Co., Boston, Mass.

COMPRESSORS, AIR
Can. Ingersoll Rand Co., Sherbrooke.
Cleveland Pneumatic Tool Co., Toronto.
Curtis Pneumatic Machy. Co., St. Louis
Elliott & Whitehall, Galt, Ont.
Garlock-Walker Machy. Co., Toronto.
Hinckley Machine Co., Hinckley, Ill.
MacGovern & Co., Montreal, Que.
Williams & Wilson, Ltd., Montreal, Que

CONDENSERS
MacGovern & Co., Montreal, Que.
Smalley-General Co., Inc., Bay City, Mich.

CONNECTING RODS
Canada Found'y & Forgings, Ltd., Welland, Ont.

CONTRACT WORK
Brown Engineering Corp., Toronto.
Ford-Smith Machine Co., Hamilton, Ont.
Homer & Wilson, Hamilton, Ont.
Katie Foundry, Ltd., Galt, Ont.
Marten Machine Co., Hamilton, Ont.
St. Lawrence Welding Co., Montreal.
Victoria Foundry Co., Ottawa.
Wilson & Co., J. C., Belleville, Ont.
Windsor Mach. Tool Co., Windsor, Ont.

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Volta Mfg. Co., Welland, Ont.

CONTROLLERS AND STARTERS
Williams Mach'y Co., A. R., Toronto.

CONTROLLING INSTRUMENTS
Taylor Instrument Co., Rochester, N.Y.

CONVERTERS, ROTARY
MacGovern & Co., Montreal, Que.

CONVEYORS, BELT AND CHAIN
Can. Link-Belt Co., Toronto, Ont.
Jones & Glassco, Montreal.

CONVEYORS, OVERHEAD
Beatty Bros., Fergus, Ont.

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Puro Sanitary Drinking Fountain Co., Haydenville, Mass.

COPING MACHINES
Bertram & Sons Co., John, Dundas, Ont.
Garlock-Walker Machinery Co., Toronto.
Niles-Bement-Pond Co., New York.
Can. Blower & Forge Co., Kitchener.

COPPER, BUS BAR, SHEET, PATES, RODS
Brown's Copper & Brass Rolling Mills, New Toronto, Ont.

COTTER PINS
Whitman & Barnes Co., St. Catharines.

COUNTERBORES AND COUNTERSINKS
Aikenhead Hardware Co., Toronto, Ont.
Blanchard Co., L. C., New York City.
Cleveland Twist Drill Co., Cleveland.
Morse Twist Drill & Mach. Co., New Bedford, Mass.
Pratt & Whitney Co., Dundas, Ont.
Rice Lewis & Son, Toronto, Ont.
Whitman & Barnes Mfg. Co., Akron, O.

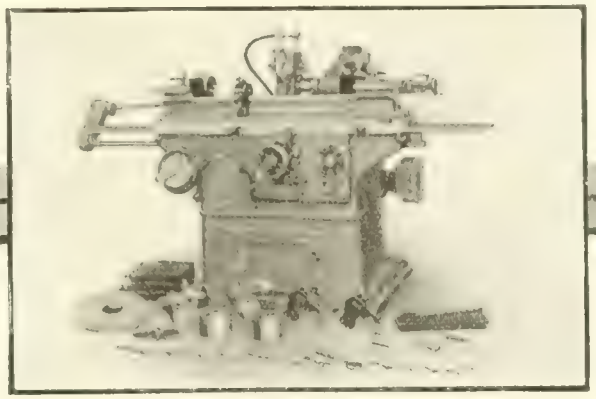
COUNTERSHAFTS
Almond Mfg. Co., Ashburnham, Mass.
Brown & Sharpe Mfg. Co., Providence, R.I.
Gray Ball Bearing Co., Ltd., Toronto.
Baird Machine Co., Bridgeport, Conn.
Ford-Smith Machine Co., Hamilton, Ont.
Foster Machine Co., Elkhart, Ind.
Williams & Wilson, Ltd., Montreal, Que.

COUPLINGS, FRICTION
Bernard Industrial Co., The A., Fortierville, Que.
Can. Link-Belt Co., Toronto, Ont.
Williams & Wilson Ltd., Montreal, Que

COUPLINGS, RAPID HOSE
Int. Machinery & Supply Co., Ltd., Montreal, Que.

COILING MACHINERY, WIRE AND SPRING
Garlock-Walker Machinery Co., Toronto.

COKE AND COAL
Hanna & Co., M. A., Cleveland, O.



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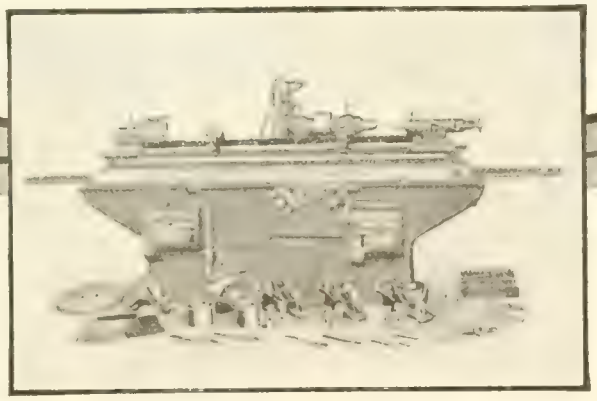

Brown & Sharpe Mfg. Co.

Providence Rhode Island U.S.A.

COUPLINGS, PLAIN, FLEXIBLE AND CUT OFF
Cleveland Pneumatic Tool Co., of Canada, Toronto.
Gardner, Robt. & Son, Montreal.
Independent Pneumatic Tool Co., Chicago
Wilson & Co., J. C., Belleville, Ont.

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Northern Crane Works, Walkerville.

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Volta Manufacturing Co., Welland, Ont

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COVERS, OIL HOLE
Can. Winkley Co., Ltd., Windsor, Ont.

CRANES, GANTRY
Can. Link-Belt Co., Toronto, Ont.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Walkerville.

CRANE RUNWAYS
MacKinnon Steel Co., Sherbrooke, Que.

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Morris Crane and Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Walkerville.
Wilson & Co., J. C., Belleville.
Williams & Wilson, Ltd., Montreal, Que.

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Dominion Bridge Co., Montreal.
Hepburn, John T., Ltd., Toronto.
MacKinnon Steel Co., Sherbrooke, Que.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Niles-Bement-Pond Co., New York.
Northern Crane Works, Walkerville.

CRANK SHAFTS
Canada Forrnd's & Forgings Ltd., Welland
Williams & Co., J. H., Brooklyn, N.Y.

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Aikenhead Hardware Co., Toronto, Ont.
Can. Link-Belt Co., Toronto
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Walkerville.
Rice Lewis & Son, Toronto, Ont.
J. C. Wilson & Co., Belleville, Ont.
Williams & Wilson, Ltd., Montreal, Que.

CRIMPS, LEATHER
Graton & Knight Mfg. Co., Worcester, Mass.

CRUSHERS
Elec. Steel & Metals, Welland, Ont.

CUPOLAS
Can. Blower & Forge Co., Kitchener.
Northern Crane Works, Walkerville.

CURB PUMPS FOR OIL, GASOLINE
Bowser Co., Ltd., S. F., Toronto, Ont.

CURRENT TRANSFORMERS
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J. C. Wilson & Co., Belleville, Ont.
Williams & Wilson, Ltd., Montreal, Que.

CUTTERS, BOLT
See Bolt Cutters.

CUTTERS, GEARS
Brown & Sharpe Mfg. Co., Providence, R.I.
Butterfield & Co., Inc., Rock Island, Que.
Fellows Gear Shaper Co., Springfield, Vt.

CUTTERS, FLUE
Cleveland Pneumatic Tool Co., Toronto.

CUTTER HEADS
Oliver Machinery Co. Grand Rapids, Mich

CUTTERS, PIPE (See Pipe Cutters)

CUTTERS, MILLING
Becker Milling Mach. Co., Boston, Mass.
Boker & Co., Inc., H., Montreal, Que.
Butterfield & Co., Rock Island, Que.
Brown & Sharpe Mfg. Co., Providence, R.I.
Can. Fairbanks-Morse Co., Ltd., Montreal
Cleveland Twist Drill Co., Cleveland.
Davidson Tool Mfg. Co, New York, N.Y.
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Illinois Tool Works, Chicago, Ill.
Morse Twist Drill & Machine Co., New Bedford.
Pratt & Whitney Co., Dundas, Ont.
Pilot Steel & Tool Co., Montreal, Que.
Rice Lewis & Son, Toronto, Ont.
Tabor Mfg. Co., Philadelphia, Pa.
Whitney Mfg. Co., Hartford, Conn.

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Cleveland Milling Machine Co., Cleveland.

CUTTING-OFF MACHINES
Armstrong Bros., Tool Co., Chicago.
Bertram & Sons Co., John Dundas
Brown & Sharpe Mfg. Co., Providence, R.I.
Can. Fairbanks-Morse Co.,Ltd., Montreal
Curtis & Curtis Co., Bridgeport, Conn.
Foss Mchy. & S'ply Co., Geo. F., Montreal
Garlock Walker Machinery Co., Toronto
Garvin Machine Co., New York.
Greenfield Tap & Die Corp., Greenfield, Mass.
Hurlburt, Rogers Machy Co., South Sudbury, Mass.
Hall & Sons, John H., Brantford, Ont.
Kennedy & Sons, Wm., Owen Sound.
Niles-Bement-Pond Co., New York, N.Y.
Peerless Machine Co., Racine, Wis.
Prest-O-Lite Co., Inc., Toronto, Ont.
Racine Tool & Machine Co., Racine, Wis
Tabor Mfg. Co., Philadelphia, Pa.
Wells Bros. of Can., Galt, Ont.
Williams & Wilson, Ltd., Montreal, Que.

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Cataract Refining Co., Ltd., Toronto.

CUTTING OIL, RECLAIMING SYSTEM
Bowser Co., Ltd., S. F., Toronto, Ont.

CUTTING AND WELDING PLANTS
Davis-Bournonville Co., Jersey City, N.J.
Prest-O-Lite Co., Inc., Toronto, Ont.
Welding & Supplies Co., Montreal, Que.

CYANIDE AND LEAD BATH POTS
Swedish Crucible Steel Co., Windsor.

CYLINDERS, AIR
Ford-Smith Machine Co., Hamilton, Ont.
Smalley General Co., Inc., Bay City, Mich

CYLINDERS, AUTOMATIC REBORING JIGS AND REAMERS
Hinckley Machine Co., Hinckley, Ill.
Kelley Reamer Co., Cleveland, O.

DEHUMIDIFYING
B. F. Sturtevant Co, Galt, Ont.

DERRICKS
Aikenhead Hardware Co., Toronto, Ont.
Dominion Bridge Co., Montreal.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.

DIAMOND TOOLS
Ford-Smith Machine Co., Hamilton, Ont.
Joyce-Koebel Co., Inc., New York City.
Wheel Trueing Tool Co., Detroit.
Williams & Wilson, Limited, Montreal

DIAMONDS, CARBON AND BORTZ
Wheel Trueing Tool Co., Detroit.

DIAMONDS, BLACK AND ROUGH
Joyce, Koebel & Co., Inc., New York.
Wheel Trueing Tool Co., Windsor, Ont.

DIE BLOCKS
General Steel Co., Milwaukee, Wis.

DIES, CUTTING
Hoggson & Pettis Mfg. Co., New Haven, Conn.

DIE HEADS, AUTOMATIC
Greenfield Tap & Die Corp., Greenfield Mass
Wells Bros. of Can., Galt, Ont.
Williams & Wilson, Ltd., Montreal, Que.

DIES, BRASS PRINTING, EMBOSSING AND LETTERING
Matthews, Jas. H., & Co., Pittsburgh, Pa

DIES FOR BIT BRACE USE
Butterfield & Co., Rock Island, Que.
A. B. Jardine & Co., Ltd., Hespeler, Ont.
Wells Brothers Co., of Canada, Galt.

DIES AND DIE STOCKS
Aikenhead Hardware Co., Toronto, Ont.
Atkins & Co., Ltd., Wm., Sheffield, Eng.
Boker & Co., Inc., H., Montreal, Que.
Butterfield & Co., Rock Island, Que.
Brown, Boggs Co., Hamilton, Ont.
Can. Fairbanks-Morse Co., Montreal.
Foss Mchy. & S'ply Co., G. F., Montreal.
Gardner, Robt. & Son, Montreal.
A. B. Jardine & Co., Hespeler, Ont.
Landis Machine Co., Waynesboro, Pa.
Marshall, Son & Bunney, Toronto.
Modern Tool Co., Erie, Pa.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
National Acme Co., Cleveland, Ohio.
Pilot Steel & Tool Co., Montreal, Que.
Pratt & Whitney Co., Dundas, Ont.
Rice Lewis & Son, Toronto, Ont.
Rickert-Shafer Co., Erie, Pa.
Stoll Co., Inc., D. H., Buffalo, N.Y.
Wells Brothers of Canada, Galt, Ont.
Williams & Wilson, Ltd., Montreal, Que

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Elliott & Whitehall, Galt, Ont.

DIES, PIPE THREADING
A. B. Jardine & Co., Ltd., Hespeler, Ont.
Landis Machine Co., Waynesboro, Pa.
Williams & Wilson, Ltd., Montreal, Que.

DIES, THREADING
Butterfield & Co., Inc., Rock Island, Que
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

DIE SINKERS
Becker Milling Machine Co., Boston
Garvin Machine Co., New York.
Pratt & Whitney Co., Dundas, Ont.

DIES FOR MACHINES
Aikenhead Hardware Co., Toronto, Ont.
Butterfield & Co., Rock Island, Que.
Firth & Sons, Thos., Montreal Que.
Landis Machine Co., Waynesboro, Pa.
Wells Brothers Co. of Canada, Galt.

DIE HEADS
Greenfield Tap & Die Corp., Greenfield Mass.
Wells Bros. of Canada, Galt, Ont.

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Geometric Tool Co., New Haven
Landis Machine Co., Waynesboro, Pa.
Modern Tool Co., Erie, Pa.
Morchea Machine & Tool Co., Detroit.
Wells Brothers Co. of Can., Galt, Ont.
Williams & Wilson, Ltd., Montreal, Que.

DIE FILING MACHINES
Oliver Mach. Co., Grand Rapids, Mich.

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Atkins & Co., Ltd., Wm., Sheffield, Eng.
Marshall, Son & Bunney, Toronto.
Firth & Sons, Thos., Montreal, Que.
Kayser-Ellison & Co., Ltd., Montreal.
Norton, Ralph B., Agent, Montreal.

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Butterfield & Co., Inc., Rock Island, Que
Wells Bros. Co. of Can., Galt, Ont.

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E. W. Bliss Co., Brooklyn, N.Y.
Brown, Boggs & Co., Hamilton, Canada
Illinois Tool Works, Chicago, Ill.
Marten Machine Co., Hamilton, Ont.
Stoll Co., D. H., Buffalo, N.Y.

DIES, SCREW AND THREAD
Butterfield & Co., Rock Island, Que.
A. B. Jardine & Co., Ltd., Hespeler, Ont.
Landis Machine Co., Waynesboro, Pa.
Modern Tool Co., Erie, Pa.
Murchey Machine & Tool Co., Detroit.
National-Acme Co., Cleveland, Ohio.
Pratt & Whitney Co., Dundas, Ont.
Wells Bros. Co., of Can., Galt, Ont.

DISCS, LEATHER, STEEL
Graton & Knight Mfg. Co., Worcester, Mass.
Swedish Steel & Importing Co., Montreal.

DIRECT CONNECTED UNITS
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DRAFT, MECHANICAL
W. H. Banfield & Sons, Toronto.
Butterfield & Co., Rock Island, Que.
Can. Blower & Forge Co., Kitchener
A. B. Jardine & Co., Hespeler, Ont.
Pratt & Whitney Co., Dundas, Ont.

DRAWING INSTRUMENTS
Hughes, Owens Co., Ltd., Montreal, Que.

DRAWING OFFICE SUPPLIES
Hughes, Owens Co., Ltd., Montreal Que.

DRESSERS, GRINDING AND EMERY WHEEL
Can. Desmond-Stephan Mfg. Co., Hamilton
Wheel Trueing Tool Co., Windsor, Ont.
Williams & Wilson, Limited, Montreal

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W. F. & John Barnes Co., Rockford.
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Canada Machinery Corp., Galt, Ont.
Foss Mchy. & S'ply Co., G. F., Montreal.
Garlock-Walker Machinery Co., Toronto
Garvin Machine Co., New York.
A. B. Jardine & Co., Ltd., Hespeler, Ont.
Niles Bement Pond Co., New York.
U. S. Mach. Tool Co., Cincinnati, Ohio.
A. R. Williams Machinery Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

DRILL RODS
Atkins & Co., Ltd., Wm., Sheffield, Eng.
Kayser Ellison & Co., Ltd., Montreal.
Marshall, Son & Bunney, Toronto.
Norton, Ralph B., Agent, Montreal.
Swedish Steel & Importing Co., Ltd., Montreal.

DRILLING MACHINES, GANG
Barnes, W. F. & John Co., Rockford, Ill
Bilton Mach. Tool Co., Bridgeport, Conn
Canada Machinery Corp., Galt, Ont.
Silver Mfg. Co., Salem, Ohio.
Williams & Wilson, Ltd., Montreal, Que.

DRILLING MACHINES, LOCOMOTIVE AND MULTIPLE SPINDLE
John Bertram & Sons Co., Dundas
Bilton Mach. Tool Co., Bridgeport, Conn.
Can. Blower & Forge Co., Kitchener, Ont
Canada Machinery Corp., Galt, Ont.
Can. Fairbanks-Morse Co., Montreal.
Foss Mchy. & S'ply Co., G. F., Montreal.
Garlock-Walker Mach. Co., Toronto.
Garvin Machine Co., New York.
Hoefer Mfg. Co., Freeport, Ill
Henry & Wright Mfg. Co., Hartford, Conn
A. B. Jardine & Co., Hespeler, Ont.
Landis Tool Co., Waynesboro, Pa.
Nat. Automatic Tool Co., Richmond, Ind.
Niles-Bement-Pond Co., New York.
Rockford Drilling Mach Co., Rockford, Ill

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Canadian Fairbanks-Morse Co., Montreal.
Canada Machinery Corp., Galt, Ont.
Garlock-Walker Machinery Co., Toronto.
Henry & Wright Mfg. Co., Hartford.
Landis Tool Co., Waynesboro, Pa.
Niles-Bement-Pond Co., New York.
Williams & Wilson Limited Montreal.

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Bilton Mach. Tool Co., Bridgeport, Conn.
W. F. & John Barnes Co., Rockford, Ill.
Canadian Fairbanks-Morse Co., Montreal
Canadian Machinery Corp., Galt, Ont.
Geo. F. Foss Mch. & S'ply Co., Montreal
Garlock-Walker Mach. Co., Toronto, Ont.
Henry & Wright Mfg. Co., Hartford, Conn.
Landis Tool Co., Waynesboro, Pa.
Niles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.
United States Mach. Tool Co., Cincinnati
Williams & Wilson Limited Montreal.

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John Bertram & Sons Co., Dundas
Garlock-Walker Mach. Co., Toronto, Ont
Can. Blower & Forge Co., Kitchener.
Canada Mach. Corp. Galt, Ont.
Ford-Smith Machine Co., Hamilton, Ont.
Garlock-Walker Mach. Co., Toronto, Ont.
Hoefer Mfg. Co., Freeport, Ill
A. B. Jardine & Co., Hespeler, Ont.
Landis Tool Co., Waynesboro, Pa.
R. McDougall Co., Galt.
Nat. Automatic Tool Co., Richmond, Ind.
Rockford Drilling Mach. Co., Rockford, Ill
Niles-Bement-Pond Co., New York.
Silver Mfg. Co., Salem, Ohio.
A. R. Williams Machinery Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

DRILLING MACHINES, SPECIAL
Hoefer Mfg. Co., Freeport, Ill.

DRILLING MACHINES, WALL RADIAL
Lynd-Farquhar Co., Boston, Mass.
Wickes Bros, Saginaw, Mich.

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Keystone Mfg. Co., Buffalo, N.Y.
Rice Lewis & Son, Toronto, Ont.
Silver Mfg. Co., Salem, Ohio.

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W. F. & John Barnes Co., Rockford, Ill
Can. Blower & Forge Co., Kitchener.
Can. Fairbanks-Morse Co., Montreal.
Geo. F. Foss Mch. & S'ply Co., Montreal
Fry's (London), Ltd., London, England
Garlock-Walker Machinery Co., Toronto.
Pratt & Whitney Co., Dundas, Ont.
Rice Lewis & Son, Toronto, Ont.
U.S. Electrical Tool Co., Cincinnati, O.
Williams & Wilson, Ltd., Montreal, Que.

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Aikenhead Hardware Co., Toronto, Ont.
Butterfield & Co., Inc., Rock Island, Que.
Cleveland Twist Drill Co., Cleveland.
Morrow Screw & Nut Co., John, Ingersoll
Morse Twist Drill & Machine Co., New Bedford, Mass.
Rice Lewis & Son, Toronto, Ont.
Whitman & Barnes Mfg. Co., Akron, O.
Wilt Twist Drill Co., of Can., Walkerville
Williams & Wilson, Ltd., Montreal, Que.

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Aikenhead Hardware Co., Toronto, Ont.
Butterfield & Co., Inc., Rock Island, Que.
Can. Blower & Forge Co., Kitchener.
Cleveland Twist Drill Co., Cleveland.
Geo. F. Foss Mch. & S'ply Co., Montreal
A. B. Jardine & Co., Hespeler, Ont.
Morrow Screw & Nut Co., John, Ingersoll
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Rice Lewis & Son, Toronto, Ont.
Whitman & Barnes Mfg. Co., Akron, O.
Wilkinson & Kompass, Hamilton, Ont.
Wilt Twist Drill Co. of Can., Walkerville

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Butterfield & Co., Inc., Rock Island, Que.
Marshall, Son & Bunney, Toronto.
John Morrow Screw & Nut Co., Ingersoll

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Boker & Co., Inc., H., Montreal, Que.
Cincinnati Electrical Tool Co., Cincinnati
Geo. F. Foss Mch. & S'ply Co., Montreal
Independent Pneumatic Tool Co., Chicago.
Niles-Bement-Pond Co., New York.
Pilot Steel & Tool Co., Montreal, Que.
Prest-O-Lite Co., Inc., Toronto, Ont.
U. S. Electrical Tool Co., Cincinnati, O.
A. R. Williams Mach. Co., Toronto.
Wilkinson & Kompass, Hamilton, Ont.
Williams & Wilson, Ltd., Montreal, Que.

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Garlock-Walker Mach. Co., Toronto, Ont.

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Armstrong-Whitworth of Can., Montreal.
Atkins & Co., Ltd., Wm., Sheffield, Eng.
Butterfield & Co., Rock Island, Que.
Cleveland Twist Drill Co., Cleveland.
Canadian Fairbanks-Morse Co., Montreal
H. A. Drury Co., Montreal.
Geo. F. Foss Mch. & S'ply Co. Montreal
Marshall, Son & Bunney, Toronto.
Morrow Screw & Nut Co., John, Ingersoll, Ont.
Morse Twist Drill & Machine Co., New Bedford, Mass.
W. F. & John Barnes Co., Rockford, Ill
Plewes, Ltd., Winnipeg, Man.
Pratt & Whitney Co., Dundas, Ont.
Rice Lewis & Son, Toronto, Ont.
Standard Machy. & Supplies, Montreal.
Taylor, J. A. M., Stair Bldg., Toronto.
Whitman & Barnes Mfg. Co., Akron, O.
Wilt Twist Drill Co. of Can., Walkerville
Wilkinson & Kompass, Hamilton, Ont.
Williams & Wilson, Ltd., Montreal, Que

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Morse Twist Drill & Mach. Co., New Bedford, Mass.
Rice Lewis & Son, Toronto, Ont.

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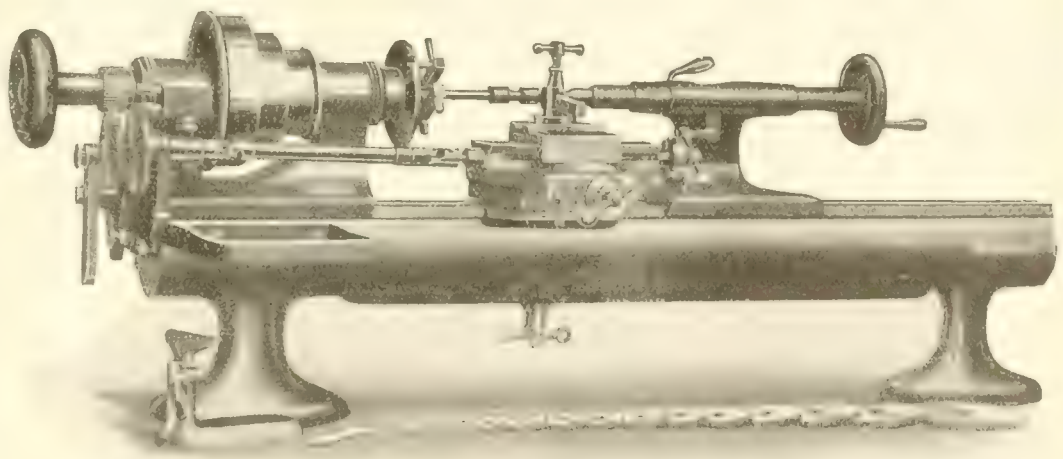

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If interested tear out this page and place with letters to be answered.

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Cincinnati Electrical Tool Co., Cincinnati.
Cleveland Twist Drill Co., Cleveland.
Garlock-Walker Mchy. Co., Toronto, Ont.
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Morse Twist Drill & Mch. Co., New Bedford, Mass.
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Wilt Twist Drill Co. of Can., Walkerville.

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Page Steel & Wire Co., New York, N.Y.
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Marshall, Son & Bunney, Toronto, Ont.
Nicholson File Co., Port Hope, Ont.
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National Machy. Co., Tiffin, Ohio.
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Blancke Co., L. C., New York City.
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Chicago Flexible Shaft Co., Chicago, Ill.
Gilbert & Barker Mfg. Co., Springfield.
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W. S. Rockwell Co., New York, N.Y.
Standard Fuel Engr. Co., Detroit, Mich.
Williams & Wilson, Ltd., Montreal, Que.

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W. S. Rockwell Co., New York, N.Y.
Toronto Iron Works, Ltd., Toronto.

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GASOLINE PUMPS, SELF-MEASURING
Bowser Co., Ltd., S. F., Toronto, Ont.
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Illinois Tool Works, Chicago, Ill.
C. E. Johanson, Inc., Toronto, Ont.
Morse Twist Drill & Machine Co., New Bedford.
Peck, Stow & Wilcox Co., Southington, Conn.
Pratt & Whitney Co., Hartford, Conn.
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Wells Brothers Co. of Canada, Galt, Ont.
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Norton, Ralph B., Agent, Montreal.
Wilson & Co., J. C., Belleville, Ont.
Williams & Co., J. H., Brooklyn, N.Y.

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Fellows Gear & Shaper Co., Springfield, V.
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Williams & Wilson, Ltd., Montreal, Que.

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Foss Mchry. & S'ply Co., G. F., Montreal
Garlock-Walker Machinery Co., Toronto.

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Wisconsin Electric Co., Inc., Racine, Wis.
Can. Machinery Corp., Galt, Ont.

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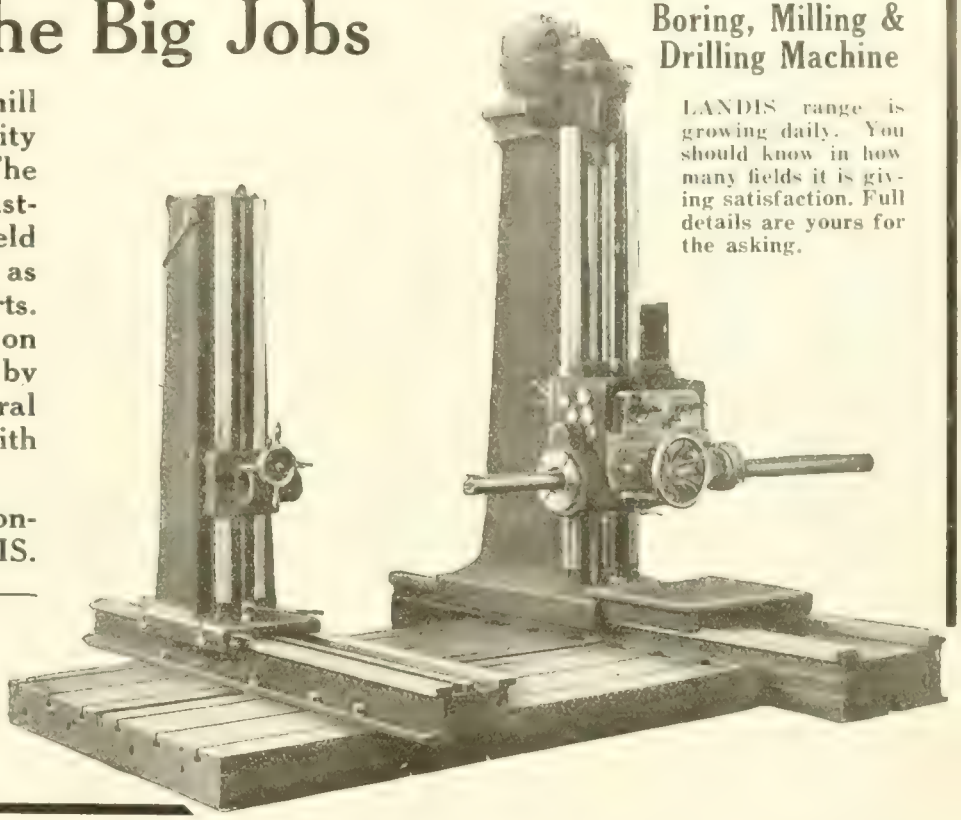

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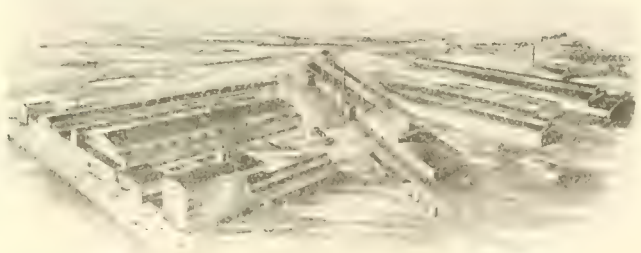

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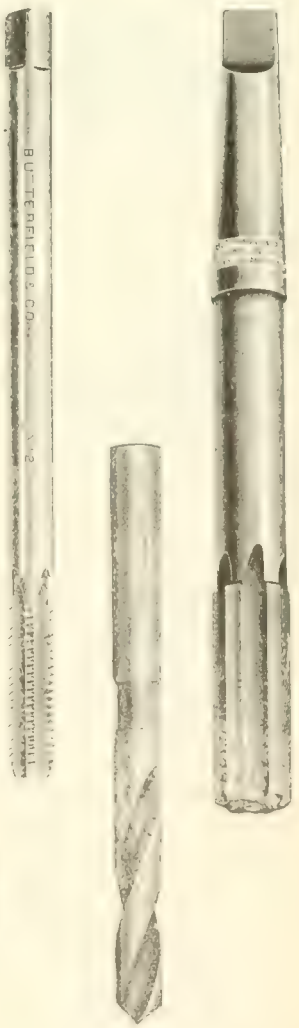

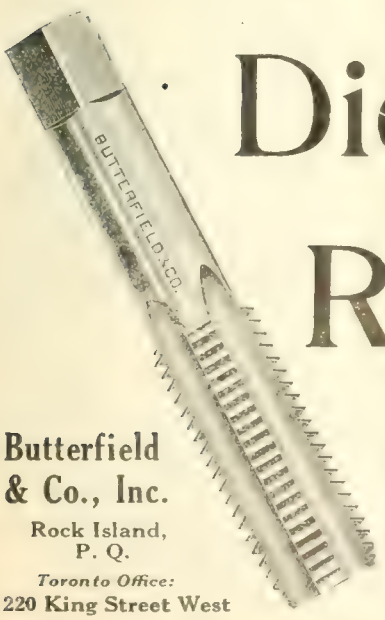

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Foss Mchy. & S'ply Co., G. F., Montreal.
Perrin, Wm. R., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

MASKS, WELDING, SMOKE, FUME, GAS, ETC.

Strong, Kennard & Nutt Co., Cleveland.

MEASURING MACHINES

Pratt & Whitney Co., Dundas, Ont.

MEASURES, REGISTERING

Bowser Co., Ltd., S. F., Toronto, Ont.

MEASURING TAPES AND RULES

Chesterman & Co., Jas., Sheffield, Eng.

METALLURGISTS

See Chemists.

METAL CLEANERS

Oakley Chemical Co., New York, N.Y.

METAL SAWS

See Saws.

METAL SAWS, POWER

Hoefer Mfg. Co., Freeport, Ill.

METALS

Brown's Copper & Brass Rolling Mills, New Toronto, Ont.
Canada Metal Co., Toronto, Ont.
Rice Lewis & Son, Toronto, Ont.
Standard Machy. & Supplies, Montreal.

METAL, STAMPINGS, SMALL

Can. Winkley Co., Ltd., Windsor, Ont.

METERS, OIL, GASOLINE, KEROSENE, ETC.

Bowser Co., Ltd., S. F., Toronto, Ont.

MICROMETERS

Almond Mfg. Co., Ashburnham, Mass.
Taylor, J. A. M., 318 Stair Bldg., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

MILLS, BRACE AND TUBE

Elec. Steel & Metals, Welland, Ont.

MILLS, SAND

Frost Mfg. Co., Chicago, Ill.

MILL MACHINERY

Alexander Fleck, Ltd., Ottawa.
Greenfield Tap & Die Corp., Greenfield.
Wells Bros. of Canada, Galt, Ont.

MILLING ARBORS

Brown & Sharpe Mfg. Co., Providence, R.I.
Kearney & Trecker Co., Milwaukee Wis.

MILLING ATTACHMENTS

Becker Milling Machine Co., Boston, Mass.
Bertram & Sons Co., John, Dundas, Ont.
Brown & Sharpe Mfg. Co., Providence.
Canada Machinery Corp., Galt, Ont.
Cincinnati Milling Machine Co., Cincinnati
Ford-Smith Mach. Co., Hamilton, Ont.
Foss Mchy. & S'ply Co., G. F., Montreal.
Hardinge Bros., Inc., Chicago, Ill.
Hendey Mach. Co., Torrington, Conn.
Hinckley Machine Works, Hinckley, Wis.
Kearney & Trecker Co., Milwaukee, Wis.
Kempsmith Mfg. Co., Milwaukee, Wis.
Niles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.
Taft-Peirce Mfg. Co., Woonsocket, R.I.
Williams & Wilson, Ltd., Montreal, Que.

MILLING MACHINES, AUTOMATIC

Bilton Mach. Tool Co., Bridgeport, Conn.
Brown & Sharpe Mfg. Co., Providence, R.I.
Betts Machine Co., Rochester, N.Y.
Williams & Wilson, Ltd., Montreal, Que.

MILLING CUTTERS

Atkins & Co., Ltd., Wm., Sheffield, Eng.
Butterfield & Co., Inc., Rock Island, Que.
Blancke Co., L. C., New York City.
Cleveland Milling Machine Co., Cleveland.
Kearney & Trecker Co., Milwaukee, Wis.
Marshall, Son & Bunney, Toronto.
Williams & Wilson, Ltd., Montreal, Que.

MILLING MACHINES, HAND

Bristol Machine Tool Co., Bristol, Conn.

MILLING MACHINES, THREAD

Gisholt Machine Co., Madison, Wis.
Hardinge Bros., Inc., Chicago, Ill.
Gray Ball Bearing Co., Ltd., Toronto.
United States Mach. Tool Co., Cincinnati.
Pratt & Whitney Co., Dundas, Ont.
Williams & Wilson, Ltd., Montreal, Que.

MILLING MACHINES, HORIZONTAL AND VERTICAL

Becker Milling Machine Co., Boston, Mass
Bristol Machine Tool Co., Bristol, Conn.
Brown & Sharpe Mfg. Co., Providence.
Bertram & Sons Co., John, Dundas, Ont.
Canada Machinery Corp., Galt, Ont.
Ford-Smith Mach. Co., Hamilton, Ont.
Garlock-Walker Machy. Co., Toronto, Ont.
Gooley & Eddund, Cortland, N.Y.
Hardinge Bros., Inc., Chicago, Ill.
Kearney & Trecker Co., Milwaukee, Wis.
Niles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.
United States Mach. Tool Co., Cincinnati.
Whitney Mfg. Co., Hartford, Conn.
Williams Machy. Co., A. R., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

MILLING MACHINES, PLAIN, BENCH AND UNIVERSAL

Becker Milling Machine Co, Boston, Mass.
Bilton Mach. Tool Co., Bridgeport, Conn.
Brown & Sharpe Mfg. Co., Providence.
Canada Machinery Corp., Galt, Ont.
Cleveland Milling Machine Co., Cleveland.
Cincinnati Milling Machine Co., Cincinnati
Ford-Smith Mach. Co., Hamilton, Ont.
Foss Mchy. & S'ply Co., G. F., Montreal
Garlock-Walker Machy. Co., Toronto, Ont.
Garvin Machine Co., New York.
National Machy. Co., Tiffin Ohio.
Gooley & Edlund, Inc., Cortland, N.Y.
Hardinge Bros., Inc., Chicago, Ill.
Hendey Machine Co., Torrington, Conn.
Kearney & Trecker Co., Milwaukee, Wis.
Kempsmith Mfg. Co., Milwaukee, Wis.
Niles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.
Williams & Wilson, Ltd., Montreal, Que.

MILLING MACHINES, PLATE

Marshalltown Mfg. Co., Marshalltown, Ia.

MILLING MACHINES, PROFILE

Brown & Sharpe Mfg. Co., Providence.
Can. Fairbanks-Morse Co., Montreal.
Foss Mchy. & S'ply Co., G. F., Montreal.
Garlock-Walker Machy. Co., Toronto, Ont.
Garvin Machine Co., New York.
Pratt & Whitney Co., Dundas, Ont.
Williams & Wilson, Ltd., Montreal, Que.

MILLING TOOLS

Aikenhead Hardware Co., Toronto, Ont.
Brown & Sharpe Mfg. Co., Providence.
Ford-Smith Mach. Co., Hamilton, Ont.
Geometric Tool Co., New Haven, Conn.
Kempsmith Mfg. Co., Milwaukee, Wis.
Rice Lewis & Son, Toronto, Ont.
Tabor Mfg. Co., Philadelphia, Pa.
Williams & Wilson, Ltd., Montreal, Que.

MINE CARS

Can. Fairbanks-Morse Co., Montreal.
Dominion Bridge Co., Montreal, Que.
Elec. Steel & Metals, Welland, Ont.
MacKinnon Steel Co., Sherbrooke, Que.
Modern Tool Co., Erie, Pa.
Pratt & Whitney Co., Dundas, Ont.

MINING MACHINERY

Can. Fairbanks-Morse Co., Montreal.
Elec. Steel & Metals, Welland, Ont.
Williams Machy. Co., A. R., Toronto.
Williams & Wilson, Ltd., Montreal, Que

MIXERS, SAND

Frost Mfg. Co., Chicago, Ill

MORTISING MACHINES

Canada Machinery Corp., Galt, Ont.
Garlock-Walker Machy. Co., Toronto, Ont.
Gray Ball Bearing Co., Ltd., Toronto.

MOTORS, ELECTRIC

Can. Fairbanks-Morse Co., Montreal.
Can. General Electric Co., Toronto.
Garlock-Walker Machy. Co., Toronto, Ont.
Lancashire Dynamo & Motor Co., Ltd., Toronto
MacGovern & Co., Montreal, Que.
Volta Mfg. Co., Welland, Ont.
Williams Mach'y Co., A. R., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

MOTOR SPRINGS

The Dunbar Brothers Co., Bristol, Conn.

MOTORCYCLE FRAME AND FORK

The Dunbar Brothers Co., Bristol, Conn.

MOTORS, PNEUMATIC

Cleveland Pneumatic Tool Co. Toronto.

MOULDS, RUBBER

Hoggson & Pettis Mfg. Co., New Haven, Conn.

MULTIPLE INDEX CENTRES

Garvin Machine Co., New York.
Graton & Knight Mfg. Co., Worcester, M.

MULTI-DRILLING, MULTI-BORING, MULTI-TAPPING MACHINERY,

Nat. Automatic Tool Co., Richmond, Ind.

INDUSTRIAL SITES

City of St. John, Quebec.

MUNTZ METAL

Brown's Copper & Brass Roller Mills, New Toronto, Ont.

MUSIC WIRE

Blancke Co., L. C., New York City.

NAIL SETS

Morrow Screw & Nut Co., J., Ingersoll, Ont

NAME PLATES, BRONZE, ETCHED AND STAMPED

Matthews & Co., Jas. H., Pittsburgh, Pa.
Pritchard-Andrews Co., Ottawa, Ont.
Turner Brass Works, Sycamore, Ill.

NICHROME CASTINGS

Can. Driver-Harris Co., Ltd., Walkerville.

NICKEL

Boker & Co., Inc., H., Montreal, Que.
Pilot Steel & Tool Co., Montreal, Que.

NICKEL SILVER

Brown's Copper & Brass Rolling Mills, New Toronto, Ont.

NICKEL STEEL

See Steel.

NIPPLE HOLDERS

Curtis & Curtis Co., Bridgeport, Conn.

NIPPLE THREADING MACHINES

Hall & Sons, Ltd., John H., Brantford.
Landis Machine Co., Waynesboro, Pa.

NITROGEN

Carter Welding Co., Toronto, Ont.

NUTS, STEEL, CASTELLATED AND COLD PRESSED

Galt Machine Screw Co., Ltd., Galt, Ont.
Morrow Screw & Nut Co., J., Ingersoll, Ont
Williams & Co., J. H., Brooklyn, N.Y.

NUTS, SEMI-FINISH AND FINISHED

Gait Machine Screw Co., Galt, Ont.
National-Acme Co., Cleveland, Ohio.
Wilkinson & Kompass, Hamilton.

NUT BURRING AND NUT MACHINES (HOT)

National Machy. Co., Tiffin, Ohio.

NUT FACING AND BOLT SHAVING MACHINES

Garvin Machine Co., New York.
National Machinery Co., Tiffin, Ohio.
Victor Tool Co., Waynesboro, Pa.
Williams & Wilson, Ltd., Montreal, Que.

NUT TAPPERS

Bertram & Sons Co., John, Dundas, Ont.
Canada Machinery Corp., Galt, Ont.
Garvin Machine Co., New York.
Hall & Son, J. H., Brantford, Ont.
Jardine & Co., A. B., Hespeler.
Landis Machine Co., Waynesboro, Pa.
National Machinery Co., Tiffin, Ohio.
Williams & Wilson, Ltd., Montreal, Que.

OIL SEPARATORS

Can. Fairbanks-Morse Co., Montreal.

OIL STONES

Aikenhead Hardware Co., Toronto, Ont.
Carborundum Co., Niagara Falls, N.Y.
Norton Co., Worcester, Mass.
Rice Lewis & Son, Toronto, Ont.

OIL STONE GRINDERS

Oliver Machy. Co., Grand Rapids, Mich

OIL STORAGE SYSTEMS

Bowser Co., Ltd., S. F., Toronto, Ont.

OPENING DIE HEADS

Greenfield Tap & Die Corp, Greenfield.
Wells Bros. of Canada, Galt, Ont.

OPTICAL SUPPLIES

Consolidated Optical Co., Toronto, Ont.

OSCILLATING VALVE GRINDERS (PNEUMATIC)

Cleveland Pneumatic Tool Co. of Canada, Toronto.

OVENS FOR BAKING, BLUING, DRYING, ENAMELING, JAPANNING AND LACQUERING

Brantford Oven & Rack Co., Brantford.

OVEN TRUCKS, STEEL

Brantford Oven & Rack Co., Brantford.
MacKinnon Steel Co., Sherbrooke, Que.

OVENS FOR DRYING, TEMPER AND OXYGEN, ELECTROLYTIC CELLS UNDER TRUCKS

Welding & Supplies Co., Montreal, Que.
Brantford Oven & Rack Co., Brantford

OXY-ACETYLENE WELDING AND CUTTING AND OUTFITS

Carter Welding Co., Toronto, Ont.
Prest-o-Lite Co., Inc. Toronto, Ont.
Davis-Bournonville Co., Jersey City, N.J.
St. Lawrence Welding Co., Montreal, Que.
Welding & Supplies Co., Montreal, Que.

OXYGEN

Nat. Electro Products Ltd., Toronto, Ont.

OXYGEN PLANTS (ELECTROLYTIC)

Davis-Bournonville Co., Jersey City, N.J.

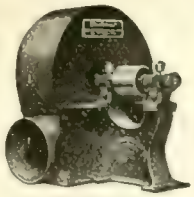
PACKINGS ASBESTOS

Cleveland Wire Spring Co., Cleveland.

PACKINGS, LEATHER, HYDRAULICS, ETC.

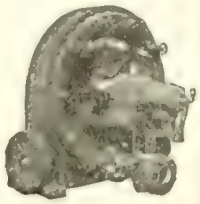
Sturtevant (TRADE MARK)

SYSTEMS


Planing Mill Fan

No. 2 Vacuum Cleaner

Autoforce Ventilator

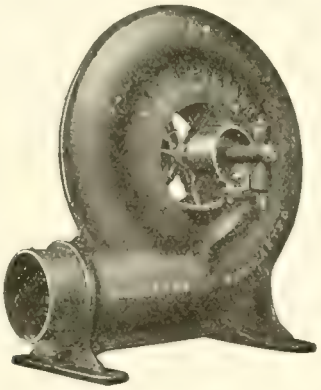

Steam Turbine

Sturtevant (TRADE MARK)

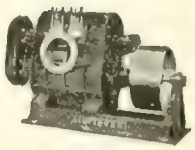
STEEL PRESSURE BLOWERS

Electric Propeller Fan

Medium Pressure Blower

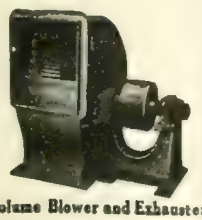


Low Pressure Blower

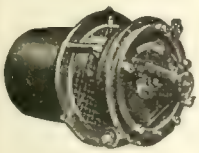

High Pressure Blower

For All Purposes

THO designed originally for supplying air to cupolas and forges Sturtevant steel pressure blowers are now used for all purposes where pressures up to 16 ounces to the square inch are to be maintained; and where air is to be forced for long distances. Regularly built with horizontal discharge but can be readily made for down blast or up blast. Built in all sizes and may be belt, motor, engine, or turbine driven. Operating and upkeep cost is remarkably low as proven by actual performance in many long term (30 years and more) installations. Design and construction are typically Sturtevant—supreme! Blast wheel is made of refined steel and galvanized to prevent rust. Wheels are accurately balanced and run smoothly when driven at high speed. Bearings are each cast in one piece and are lined with highly durable non-heating white metal. Write for catalogue.


Volume Blower and Exhauster

Gasolene Generating Set


Turbo-Blower

Direct Current Motor

B. F. STURTEVANT COMPANY of Canada, Ltd.

Factory and Main Office
Galt, Ontario

Sales Office: Toronto,
Montreal, Winnipeg

Type H Air Washer

Fuel Economizers

Sturtevant (TRADE MARK)

PRODUCTS

VS-7 Steam Engine

Heater

Ferrin, Ltd., William, Toronto.

PANS, WET AND DRY
Frost Mfg. Co., Chicago, Ill.

PAPER MILL CONVEYORS AND DRIVES
Bertrams, Ltd., Edinburgh, Scotland.
Can. Link-Belt Co., Toronto, Ont.
MacKinnon Steel Co., Sherbrooke, Que

PARTITIONS, WIRE
See Guards

PAPER MILL MACHINERY
Garlock Walker Machinery Co., Toronto.
MacKinnon Steel Co., Sherbrooke, Que.

PATTERN SHOP EQUIPMENT
Canada Machinery Corp., Galt, Ont.
Oliver Machy. Co., Grand Rapids, Mich.
Garlock-Walker Machinery Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que

PATTERN MAKERS' LATHES
See Lathes.

PATENT SOLICITORS
Budden, Hanbury A., Montreal
Fetherstonhaugh & Co., Ottawa.
Marion & Marion, Montreal.
Ridout & Maybee, Toronto.
Shipman & C[illegible], Ottawa.
Wilson & Co., J. C., Belleville, Ont.
Greenbank, Ltd., Belleville, Ont.
Marten Machine Co., Hamilton, Ont.

PECK CARRIERS FOR POWER PLANTS
Can. Link-Belt Co., Toronto, Ont.

PENSTOCKS
William Hamilton Co., Peterboro, Ont.

PERFORATED METALS AND ORNAMENTAL IRON GOODS
Canada Wire & Iron Goods Co., Hamilton

PIG IRON
Hanna & Co., M. A., Cleveland, O.
Steel Co. of Canada, Ltd., Hamilton, Ont.

PINS, TAPER
Morrow Screw & Nut Co., J., Ingersoll, Ont

PINS, BELT-LACING
Clipper Belt Lacer Co., Grand Rapids.

PIPE FITTINGS, MALLEABLE AND CAST IRON
International Malleable Iron Co., Guelph

PIPE CUTTING AND THREADING MACHINES
Can. Fairbanks-Morse Co., Montreal.
Curtis & Curtis Co., Bridgeport, Conn.
Garlock-Walker Machinery Co., Toronto.
Garvin Machine Co., New York.
Greenfield Tap & Die Corp., Greenfield.
Hall & Sons, John H., Brantford.
Jardine & Co., A. B., Hespeler, Ont.
Landis Machine Co., Waynesboro, Pa.
McDougall Co., R., Galt.
Wells Bros. Co. of Canada, Galt, Ont.
Williams Tool Co., Erie, Pa.
Williams Machy. Co., A. R., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

PHOTOSTATS
Commercial Camera Co., Providence, R.I.

PIPE RIVETED STEEL
Toronto Iron Works, Ltd., Toronto.
William Hamilton Co., Peterboro, Ont.

PIERCING
Oliver Machy. Co., Grand Rapids, Mich.

PIPE CUTTERS, ROLLING
Curtis & Curtis Co., Bridgeport Conn
Greenfield Tap & Die Corp., Greenfield.
Hall & Sons, Ltd., John H., Brantford.
Wells Bros. Co. of Canada, Galt, Ont.

PIPE TOOLS AND DIES
Greenfield Tap & Die Corp., Greenfield.
Wells Bros. of Canada, Galt, Ont.

PIPE CUTTERS AND REAMERS
Greenfield Tap & Die Corp., Greenfield.
Wells Bros. of Canada, Galt, Ont.

PIPE STOCKS AND THREADERS
Greenfield Tap & Die Corp., Greenfield.
Wells Bros. of Canada, Galt, Ont.

PIPE TAPS AND VISES
Greenfield Tap & Die Corp., Greenfield.
Wells Bros. of Canada, Galt, Ont.

PIPE WRENCHES
Greenfield Tap & Die Corp., Greenfield.
Wells Bros. of Canada, Galt, Ont.

PISTON AND PISTON RING MACHINES
National Acme Co., Windsor, Vt.

PLANER BOLTS
Morrow Screw & Nut Co., J., Ingersoll, Ont

PLANER JACKS
Armstrong Bros. Tool Co., Chicago.

PLANERS, STANDARD AND ROTARY
Betts Machine Co., Rochester, N.Y.
Bertram & Sons Co., John, Dundas.
Oliver Machy. Co., Grand Rapids, Mich.
Canada Machinery Corp., Galt, Ont.
Can. [illegible] Morse Co., Montreal
Foss Mchy. & S'ply Co., G. F., Montreal
Kerr & Son, Robt., Montreal.
[illegible] Machinery Co., Toronto.
Marten Machine Co., New York.
Morton Mfg. Co., Muskegon Heights, Mich
Niles-Bement-Pond Co., New York.
Whitcomb-Blaisdell Mach. Tool Co., Worcester, Mass.
Williams & Wilson, Ltd., Montreal, Que.

PLANING AND SHAPING MACHINERY
Canada Machinery Corp., Galt, Ont.
Can. Fairbanks-Morse Co., Montreal.
Foss Mchy. & S'ply Co., G. F., Montreal.
Garlock Walker Machinery Co., Toronto.
Garvin Machine Co., New York.
Niles-Bement-Pond Co., New York.
Williams Machy. Co., A. R., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

PLANER-SHAPER, COMBINED OPEN SIDE
Lynd-Farquhar Co., Boston.
Williams & Wilson, Ltd., Montreal, Que.

POWER HAMMERS
Quickwork Co., St. Marys, Ohio.

PLANING MILL EXHAUSTERS
Can. Blower & Forge Co., Kitchener, Ont.
MacGovern & Co., Montreal, Que.
Niles-Bement-Pond Co., New York.

PLIERS
Aikenhead Hardware Co., Toronto.
Can. Billings & Spencer Ltd., Welland.
Peck, Stow & Wilcox Co., Southington, Ct.
Rice Lewis & Son, Toronto, Ont.
Whitman & Barnes Co., St. Catharines.

PNEUMATIC TOOLS
Can. Ingersoll-Rand Co., Montreal, Que.
Cleveland Pneumatic Tool Co., Can., Toronto
Curtis Pneumatic Machy. Co., St. Louis.
Garlock Walker Machy. Co., Toronto.
Int. Mach. & Supply Co., Ltd., Montreal.
Independent Pneumatic Tool Co., Chicago.

POWER CRANES, HAND
MacKinnon Steel Co., Sherbrooke, Que.

POLISHING MACHINES
Brown & Sharpe Mfg. Co., Providence, R.I.
Ford Smith Machine Co., Hamilton, Ont.
Williams & Wilson, Ltd., Montreal, Que.

POTS AND KETTLES, CAST STEEL
Elec. Steel & Metals, Welland, Ont.

POLISHING PLATES
Greenfield Tap & Die Corp., Greenfield.
Wells Bros. of Canada, Galt, Ont.
Williams & Wilson, Ltd., Montreal, Que.

POWER HOUSE CONVEYORS
Can. Link-Belt Co., Toronto, Ont.
Morris Crane & Hoist Co., Ltd., Herbert, Niagara Falls, Ont.

POWER TRANSMISSION MCHY.
Williams & Wilson, Ltd., Montreal, Que.

PRESSED STEEL PARTS
Gray Ball Bearing Co., Ltd., Toronto.

PRESSERS, ARBOR
Atlas Press Co., Kalamazoo, Mich.
Metalwood Mfg. Co., Detroit, Mich.
Williams & Wilson, Ltd., Montreal, Que.

PRESSES, BROACHING, FORGING AND FLANGING
Atlas Press Co., Kalamazoo, Mich
Bliss Co., E. W., Brooklyn, N.Y.
Metalwood Mfg. Co., Detroit, Mich
Toledo Machine & Tool Co., Toledo.
Stoll Co., D. H., Buffalo, N.Y.
Williams & Wilson, Ltd., Montreal, Que.

PRESSES, CAM, TOGGLE, EYELET
Baird Machine Co., Bridgeport, Conn.
Bliss Co., E. W., Brooklyn, N.Y.
Consolidated Press Co., Hastings, Mich.
Toledo Machine & Tool Co., Toledo.
Stoll Co., D. H., Buffalo, N.Y.
Williams & Wilson, Ltd., Montreal, Que.

PRESSES, FILTER
Perrin, Ltd., William R., Toronto.
Smalley-General Co., Inc., Bay City, Mich.

PRESSES, PNEUMATIC
Metalwood Mfg. Co., Detroit, Mich.
Toledo Machine & Tool Co., Toledo.

PRESSES, DROP AND FORGING
Bliss Co., E. W., Brooklyn, N.Y.
Brown Boggs Co. Ltd., Hamilton.
Can. Fairbanks-Morse Co., Montreal.
Niles-Bement-Pond Co., New York.
Perrin, Ltd., William R., Toronto.
Stoll Co., D. H., Buffalo, N.Y.
Toledo Machine & Tool Co., Toledo.
Williams & Wilson, Ltd., Montreal, Que.

PRESSES, HYDRAULIC
Bertram & Sons Co., John, Dundas.
Metalwood Mfg. Co., Detroit, Mich.
Niles-Bement-Pond Co., New York.
Perrin, Ltd., William R., Toronto.
Toledo Machine & Tool Co., Toledo.
Stoll Co., Inc., D. H., Buffalo, N.Y.
West Tire Setter Co., Rochester, N.Y.
Williams Machy. Co., A. R., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

PRESSES, BALING
Perrin, Ltd., William R., Toronto.

PRESSES, POWER
Baird Machine Co., Bridgeport, Conn.
Bliss Co., E. W., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Ont
Canada Machinery Corp., Galt, Ont.
Can. Fairbanks-Morse Co., Montreal.
Consolidated Press Co., Hastings, Mich
Garlock-Walker Machinery Co., Toronto.
Perrin, Ltd., William R., Toronto.
Stoll Co., D. H., Buffalo, N.Y.
Toledo Machine & Tool Co., Toledo.
Williams Machy. Co., A. R., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

PRESSES, SPRING FOOT
Bliss Co., E. W., Brooklyn, N.Y.
Brown, Boggs & Co., Hamilton, Ont.
Consolidated Press Co., Hastings, Mich.
Toledo Machine & Tool Co., Toledo.
Williams & Wilson, Ltd., Montreal, Que.

PRESSES, SCREW
Barnes & Co., W. F. & Jno., Rockford, Ill
Bliss Co., E. W., Brooklyn, N.Y.
Manhattan Machine & Tool Co., Grand Rapids, Mich.
Perrin, Ltd., William R., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

PRESSES, SEAL
Hoggson & Pettis Mfg. Co., New Haven, Conn.

PRESSES, TRIMMING
Bliss Co., E. W., Brooklyn, N.Y.
Canada Machinery Corp., Galt, Ont.
Consolidated Press Co., Hastings, Mich
Stoll Co., D. H., Buffalo, N.Y.
Williams & Wilson, Ltd., Montreal, Que.

PROPELLERS
Kennedy & Sons, Wm., Owen Sound.

PROTECTIVE COATINGS
H. H. Robertson, Ltd., Sarnia, Ont.

PSYCROMETERS, SLING
Taylor Instrument Co., Rochester, N.Y.

PULLEYS
Algoma Steel Corp., Sault Ste. Marie, Ont
American Pulley Co., Philadelphia.
Baird Machine Co., Bridgeport, Conn.
Bernard Industrial Co., Fortierville, Que.
Brown & Sharpe Mfg. Co., Providence.
Can. Fairbanks-Morse Co., Montreal.
Ford-Smith Machine Co., Hamilton, Ont.
Kennedy & Sons, Ltd., W., Owen Sound.
Positive Clutch & Pulley Works Ltd., Toronto.
Wilson & Co., J. C., Belleville, Ont.,
Williams Machy. Co., A. R., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

PULLEYS, STEEL SASH, STEEL BELT
American Pulley Co., Philadelphia, Pa.

PULLEYS, FRICTION, CLUTCH
American Pulley Co., Philadelphia, Pa.
Baird Machine Co., Bridgeport, Conn.
Bernard Industrial Co., A., Fortierville, Q
Can. Link-Belt Co., Toronto, Ont.
Carlyle Johnson Mch. Co., Manchester, Ct.
Positive Clutch & Pulley Works, Toronto.
Jones & Glassco, Montreal.
Williams & Wilson, Ltd., Montreal, Que.

PULP MILL MACHINERY
MacKinnon Steel Co., Sherbrooke, Que.

PUMPS, BOILER FEED
Geo. W. Cobb, Ltd., Fergus

PUMPS, CENTRIFUGAL
Bowser Co., Ltd., S. F., Toronto, Ont.
Brown & Sharpe Mfg. Co., Providence, R.I.
Can. Blower & Forge Co., Kitchener, Ont.
Can. Ingersoll-Rand Co., Montreal, Que.
Darling Bros., Ltd., Montreal, Que.
Pratt & Whitney Co., Dundas, Ont.
Williams & Wilson, Ltd., Montreal, Que

PUMPS, FUEL OIL
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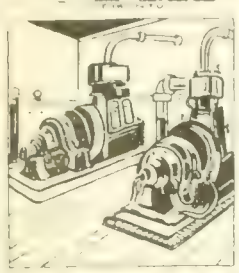

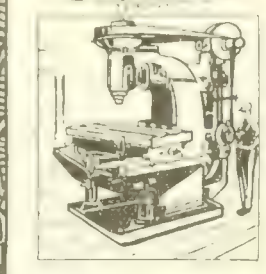

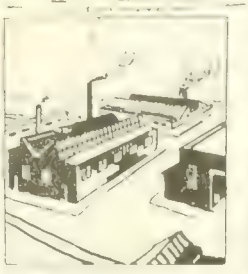

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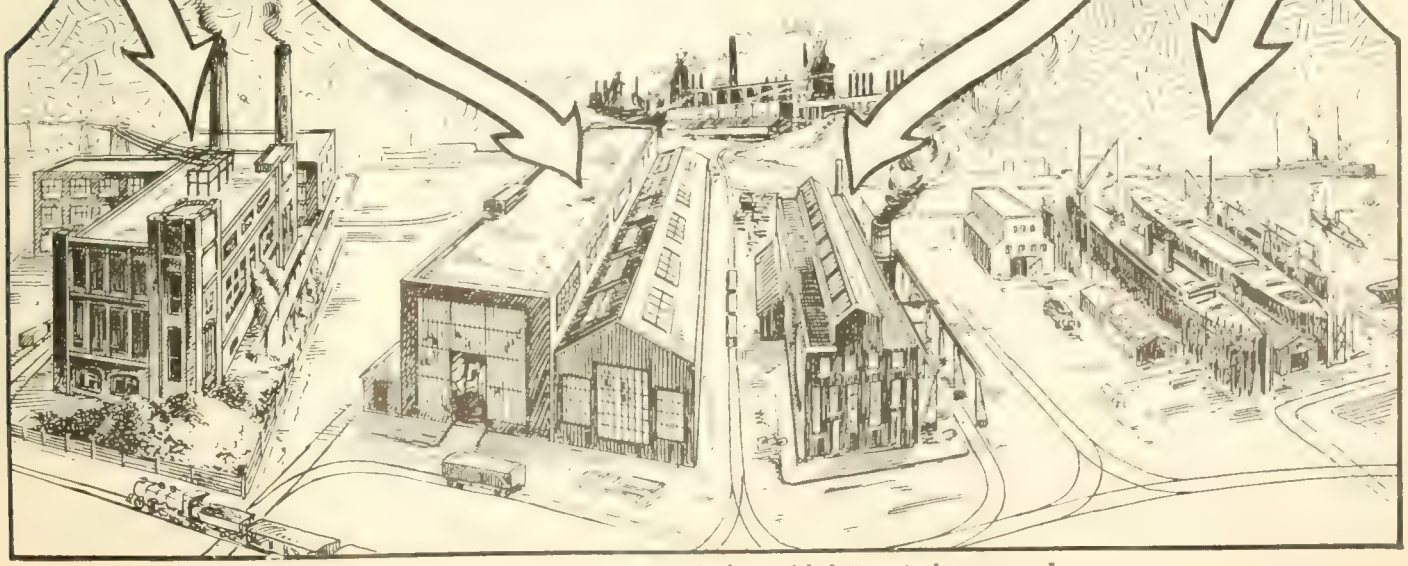

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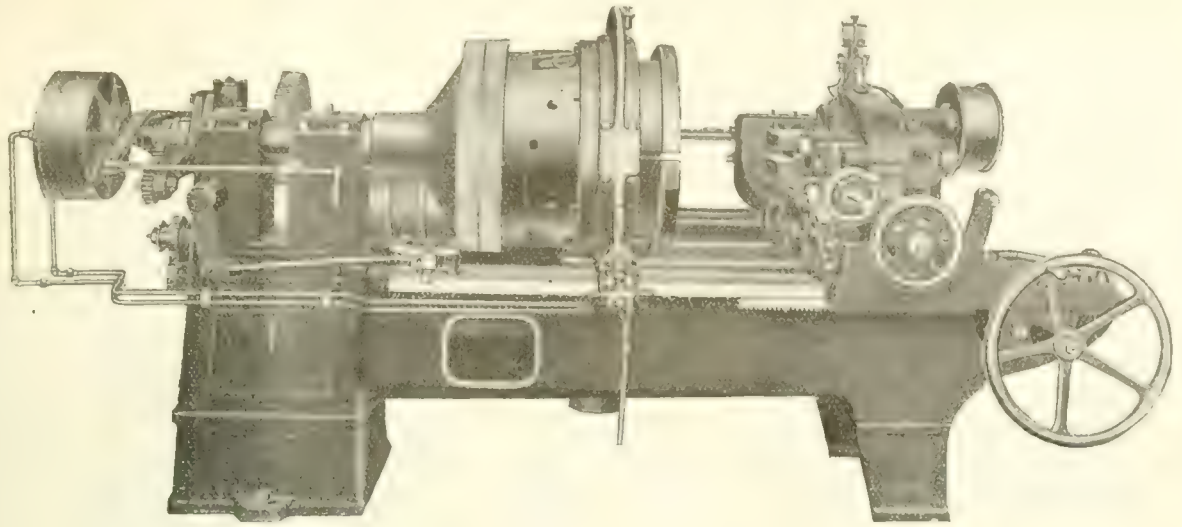

SMALLEY GENERAL

No. 1 FLANGE THREAD MILLER

This Flange Thread Miller Is a *Real* Cost Cutter

It is the most efficient and reliable tool of its kind because of its simplicity of design, the care used in its manufacture and its many universal features.

With this perfectly-built tool you can mill flange threads with fewer rejects, with greater accuracy, with greater speed and at a lower cost than can be obtained by any other method of thread cutting.

While the work held in the chuck makes one revolution, the milling head is moved back on the ways, a distance amounting to the pitch of the thread to be milled, and when a multiple tooth hob is used, the thread is complete at ONE revolution of the work. This is but one of many features of the Smalley-General Flange Thread Millers.

Skilled Labor Not Necessary

It is a mistake to believe that the adoption of a thread miller of the Smalley-General type requires skilled, high-priced help. The machine being simple and convenient to operate, ordinary intelligent labor can turn out accurate work without trouble.

Wherever the Smalley-General Thread Miller is introduced a reduction in tool room expense follows in its wake. Don't you believe it is worth investigating?

There are several other points about the Smalley-General Flange Thread Miller that you should know about. Our comprehensive circular, and any other data you may require, will be quickly sent upon request.

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If interested tear out this page and place with letters to be answered.

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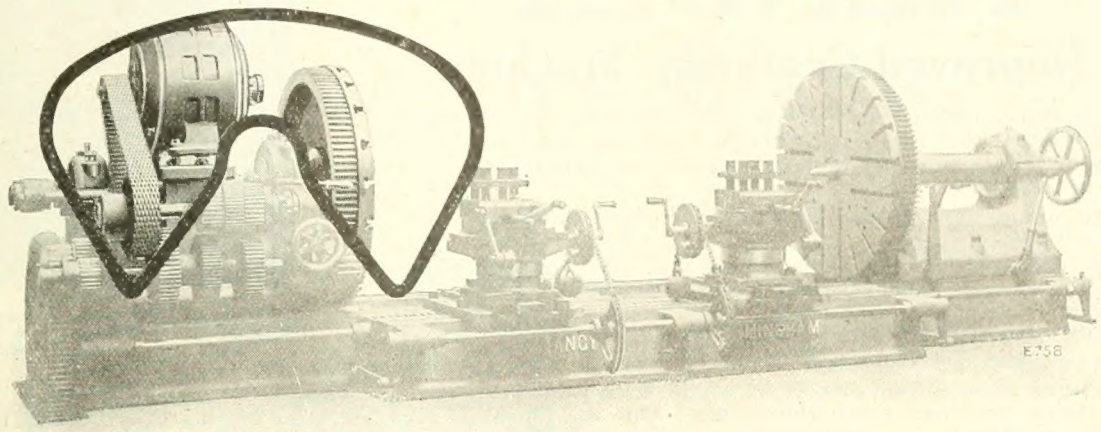

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Kennedy & Son, Wm., Owen Sound, Ont.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Walkerville.

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Norton, Ralph B., Agent, Montreal.

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Shuster Co., F. B., New Haven, Conn.

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Quickwork Co., St. Marys, Ohio.

WRENCHES, PIPE, POWER
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Page Steel & Wire Co., New York, N.Y.

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WIRE, LINK FABRIC
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Cleveland Pneumatic Tool Co. of Canada, Toronto.
Garlock-Walker Machinery Co., Toronto.
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Butterfield & Co., Rock Island, Que.
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Wells Bros. of Canada, Galt, Ont.
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Whitman & Barnes Mfg. Co., Akron, O.

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Whitman & Barnes Co., St. Catharines.

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Aikenhead Hardware Co., Toronto, Ont.
Marshall, Son & Bunney, Toronto.
Peck, Stow & Wilcox Co., Southington.
Rice Lewis & Son, Toronto, Ont.
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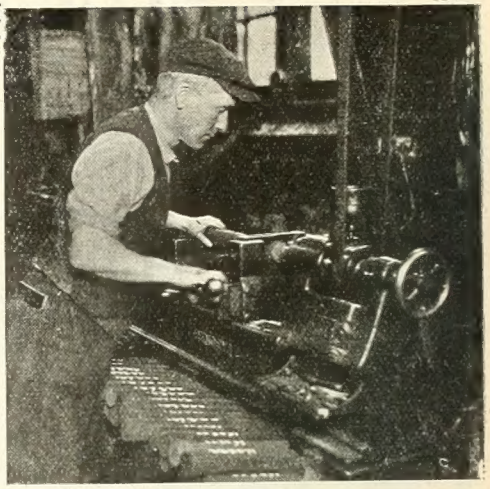
Williams & Wilson, Ltd., Montreal, Que.

HENDEY

Improved Centering Machine



Hendey centering machine on centering work in plant of Can. General Electric Co. on all sorts of portions of their product.

ASSURES perfect results at low cost. The distribution of metal insures the maximum strength with the least weight of machine; in this manner we have conserved on material and hence on machine cost.

Here are a few of the **Hendey** Improved Centering Machine features:—

The head is rigidly clamped to the bed, giving permanent alignment of spindle. Spindle is large in diameter with ample bearings, having felt oilers. Front journal is made taper, after the well-known pattern of our lathe and milling machine spindles.

Jaws of vise and supporting block are made of steel, hardened and ground.

Jaws are aligned from spindle by proof bar carried in spindle. This care in alignment is exercised in order to enable machine to accurately centre stock for finishing purposes after coming from turret lathe or screw machine.

Parallel movment of vise and block is maintained by means of the connecting rod and bevel geared drive at back of machine, controlled from handle at front of vise. No matter what the diameter of bar may be, it will always be supported in a horizontal position. Saddles are gibbed and fitted to bed, and provided with binding handles for ready clamping in position.

Capacity of machine is from 5-16 to 4 inches inclusive.

Let us send our circular

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The Hendey Machine Company, Torrington, Conn., U.S.A.

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In ordering blades, be sure to specify just what work they are expected to do, so that we can furnish a blade that will exactly suit your requirements.

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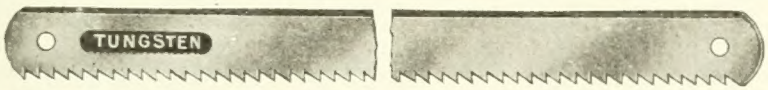

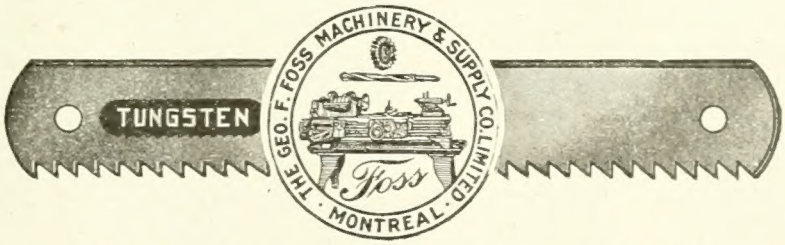

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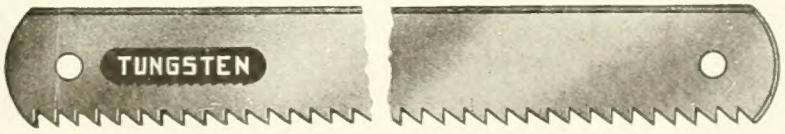
For "Racine" and all heavy duty machines



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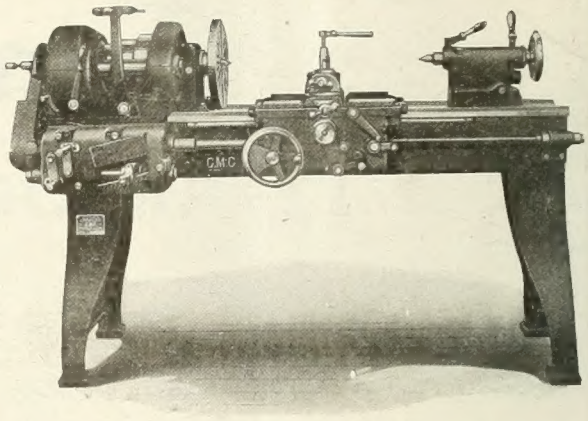

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